

1999 Market Monitor: Electric Industry Restructuring

Division of Energy Resources
Commonwealth of Massachusetts
Office of Consumer Affairs and Business Regulation

Introduction

During the twelve-month period ending in December 1999, the electric utility industry in Massachusetts continued its progress toward reliance on competitive markets. Transitional rate reductions mandated by the restructuring legislation resulted in more than \$535 million saved by Massachusetts electric customers. In addition, wholesale electricity markets underwent a major transformation as the market for "spot" or daily wholesale transactions shifted from a cost-based to a bid-based system. The Restructuring Act requires the Division of Energy Resources to monitor changes in the electricity markets each year. This report contains descriptions of the highlights and significant events in 1999.

Highlights

- *Consumers saved more than \$535 million in 1999.*
- *The average residential customer saved \$92 in 1999.*
- *Utility mergers transformed the industry landscape.*
- *Wholesale "spot" market shifted to competitive bidding.*
- *Large commercial and industrial customers took advantage of competitive electricity supply.*
- *The number of Default Service customers increased significantly.*
- *Price disparities did not change among customer sectors or service territories.*

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THE MASSACHUSETTS
DIVISION OF ENERGY
RESOURCES

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The Commonwealth
of Massachusetts

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Lieutenant Governor

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Consumer Affairs and
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Energy Resources

Table 1: Savings from Mandated Rate Reductions

	Residential	Commercial	Industrial	Other	All Customers
1999 Sales (Billions of kWh)	14.875	20.899	7.666	0.285	43.724
Average Number of Customers (1999)	2,174,668	278,728	7,860	6,154	2,467,410
Average Annual Expenditure Per Customer (1999)	\$703	\$6,428	\$70,907	\$8,287	\$1,592
Average Annual Savings Per Customer (1999)	\$92	\$900	\$9,910	\$1,055	\$219
Estimated Total Savings (millions)	\$200	\$251	\$78	\$6	\$535

Sources: Energy Information Administration EIA Forms (1999), EIA Power Annual 1998, DOER

The Electric Restructuring Act of 1997**GOALS**

The Act provides the framework for the evolution of the competitive electric industry in Massachusetts. Its primary goals are to reduce electricity prices, provide choice of power suppliers to all retail customers, maintain the reliability of the electric system, improve distribution performance, and ensure consumer protection and education.

PROVISIONS

Recognizing that restructuring the industry would be a complex process, the Legislature specified that transition to competition should occur in "an orderly manner." Beginning on March 1, 1998, the most dramatic provision of the Act gave retail customers of the affected distribution companies the option to choose their generation (power) supplier. They also began to receive at least a 10% discount (relative to 1997 rates) on their electric bills. These customers received an additional 5% decrease starting September 1, 1999.

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the full Market Monitor 1999
report can be found on our
web site at
www.state.ma.us/doer**

**Suggestions and comments
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1999 in Review**1. Consumers Saved Over \$535 Million In 1999.**

As mandated by the Act, each distribution company was able to meet the required fifteen percent savings by September 1999. Massachusetts consumers saved over \$535 million over pre-restructuring rates. Over the course of the year, residential customers saved \$200 million, commercial customers \$251 million, and industrial customers \$78 million. The average residential customer saved \$92 in 1999. Commercial and industrial customers saved, on average, \$900 and \$9,910 respectively (see Table 1). When added to the savings realized in 1998, total savings after twenty-two months of restructuring equals \$910 million.

2. Massachusetts Enjoyed 4th Highest Savings Among Deregulated States.

For 1999, Massachusetts featured the 4th highest percent reduction in price among deregulated states. Of the 21 states and the District of Columbia, only Pennsylvania, Rhode Island, and Illinois showed greater percent rate decreases than Massachusetts. Stimulated by the five percent rate cut mandated by the Restructuring Act, ratepayers saved an average of six percent over 1998 prices.

3. The Number of Default Service Customers Increased.

In 1999, the percentage of Massachusetts customers receiving default service grew from 13.2% to 19.0%, an increase of 146,070 customers. Despite the fact that default service customers are supposed to receive market-priced power, default rates continued to be priced below market at standard offer levels. As a consequence, some utilities accumulated costs to serve default service customers that will have to be recovered at a later date.

4. The Number of Customers Served by Competitive Suppliers Grew Slowly.

As in 1998, the competitive retail market for electricity grew slowly in 1999. At the end of 1999, only 9,009 of nearly 2.5 million eligible Massachusetts customers had switched to a competitive supplier. Low standard offer and default service rates, and immature wholesale electricity markets contributed to minimal competition. Even though the number of licensed suppliers increased, few retail electricity products were available in 1999.

5. Price Disparities Did Not Change Dramatically.

Price disparities among the Commonwealth's distribution companies experienced no significant changes despite statewide rate reductions. Substantial differences in rates existed between the different service territories. In addition, the data indicate that customer rates continued to vary among customer sectors—on average, residential customers pay the highest electric rates, and industrial customers the lowest.

6. Merger Activity Changed the Retail Market Landscape.

Following substantial changes in the ownership of generating plants in 1998, 1999 saw unprecedented merger activity among distribution companies. In the pursuit of increased efficiency, greater market share, and broader service territories, local distribution companies in Massachusetts joined with each other to form bigger corporations. Three mergers saw activity in 1999: BEC Energy and Commonwealth Energy joined to form

NSTAR, New England Electric Systems merged with the National Grid Group from England, and Eastern Utilities Associates was acquired by New England Electric Systems.

7. Limited Number of Eligible Households Obtain Residential Discount Rate.

In spite of increased outreach and expanded eligibility criteria in 1999, the number of households receiving the discount rate increased only slightly compared to pre-deregulation levels (see Figure 6).

8. Wholesale "Spot" Markets Shifted to Competitive Bids.

On May 1, 1999, the Independent System Operator of New England (ISO-NE) initiated a "spot" market for wholesale electricity and energy products. The new competitive bidding system was intended to stimulate competition for wholesale electricity and keep prices low. Early experience revealed significant increases in price volatility and pointed to a need for additional reforms.

Table 2: 1998 and 1999 Price Levels for Distribution Companies (cents/kWh)

Distribution Company	Residential			Commercial			Industrial		
	1999	1998	Change	1999	1998	Change	1999	1998	Change
Boston Edison	11.8	12.0	-1.5%	9.4	10.0	-5.7%	8.9	9.2	-3.6%
Cambridge Electric	10.8	11.5	-5.8%	7.1	7.6	-6.9%	6.4	7.0	-7.6%
Commonwealth Electric	11.9	12.5	-4.8%	9.5	10.0	-5.1%	7.7	8.5	-8.5%
Eastern Edison	9.3	9.8	-5.2%	8.0	8.6	-6.2%	7.9	8.5	-7.2%
Fitchburg Gas & Electric	11.9	11.9	-0.4%	11.3	11.8	-4.3%	8.9	8.9	-0.8%
Massachusetts Electric	8.9	9.7	-8.1%	7.5	8.7	-13.2%	6.4	7.7	-16.4%
Nantucket Electric	11.5	12.3	-7.2%	12.4	13.2	-5.6%	17.5	18.3	-4.2%
Western Massachusetts Electric	10.5	10.8	-2.8%	9.0	9.3	-3.2%	7.5	7.7	-1.9%
Price Disparity	1.7	1.5		4.0	3.7		1.2	0.6	

Source: FERC Form 1, EIA 826

Electricity Prices: Massachusetts, New England, and the Nation

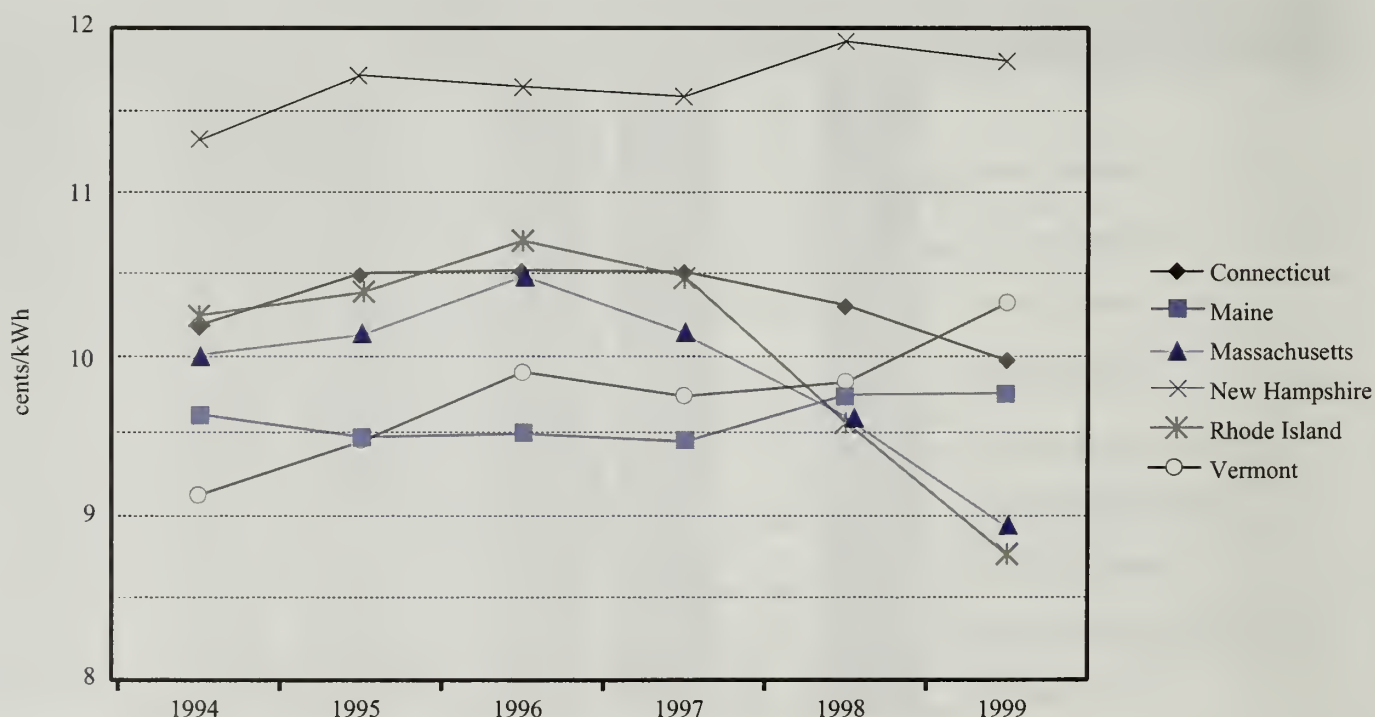
Massachusetts continues to make progress in price reductions relative to the other New England states (Figure 1). Only Rhode Island, which started restructuring at about the same time as Massachusetts, has done as well. The Commonwealth continues to make gains relative to other states in the nation, but still remains in a group of high-priced states. In 1999, Massachusetts was ranked as having the 9th most expensive electricity prices (8.9 cents per kWh). That is the same ranking reported for 1998.

Figure 2 shows 1999 price data for each state. The prices shown are the weighted-average of prices paid by all customers in each state. The U.S. average electricity price is 6.6 cents per kWh. However, the United States continues to have widely disparate electricity prices

among the states with a low of 4.0 cents per kWh (Idaho) and a high of 11.9 cents per kWh (Hawaii). This disparity is reflective of wide differences in supply and demand conditions across the nation.

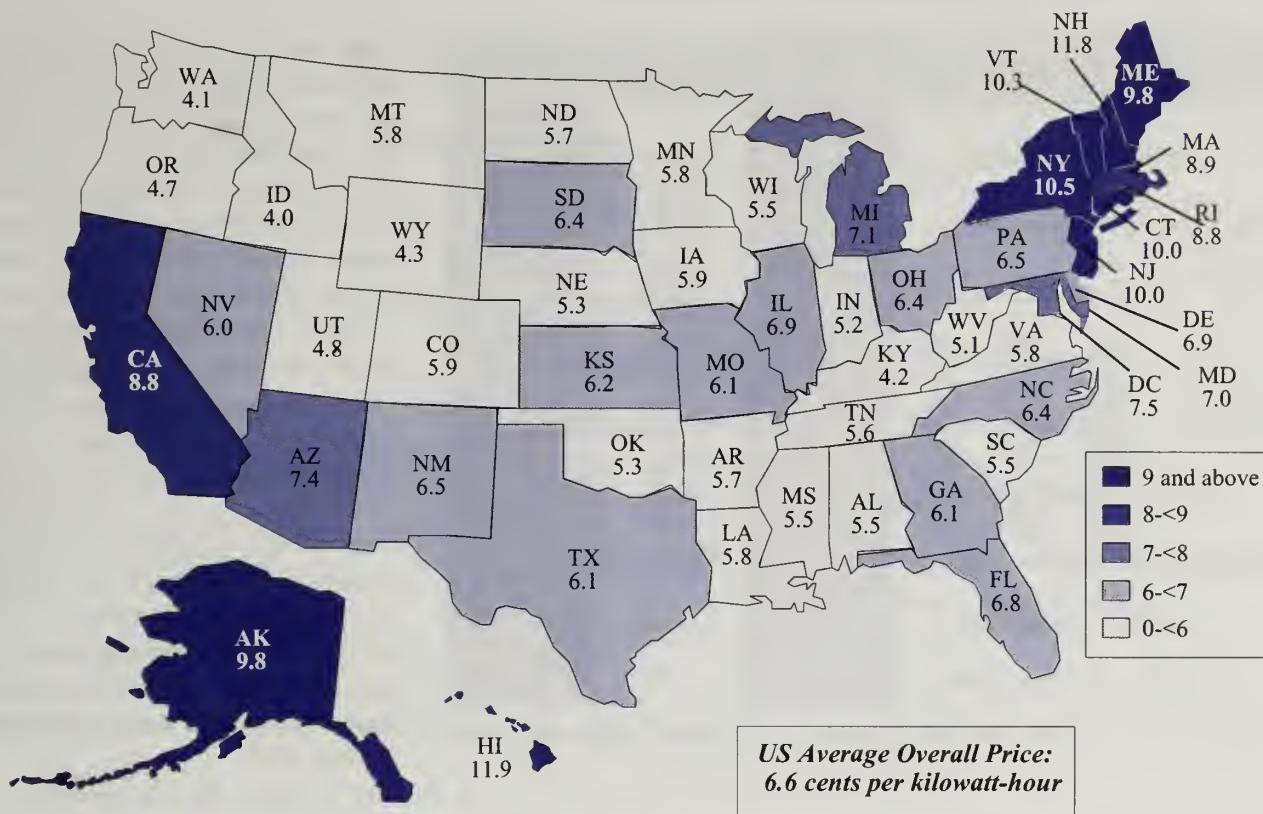
An examination of Figure 2 shows a cluster of states with prices above 8.0 cents per kWh. Outside of California, Alaska, and Hawaii, all of these states are located in the northeastern United States. The difference between the lowest price state in this group (Rhode Island at 8.8 cents per kWh) and the next region (the District of Columbia at 7.5 cents per kWh) is a large 1.3 cents per kWh. Massachusetts continues to be a high-cost state for electricity despite the gains from restructuring.

Figure 1: Historical Electricity Prices for All Customers, New England States



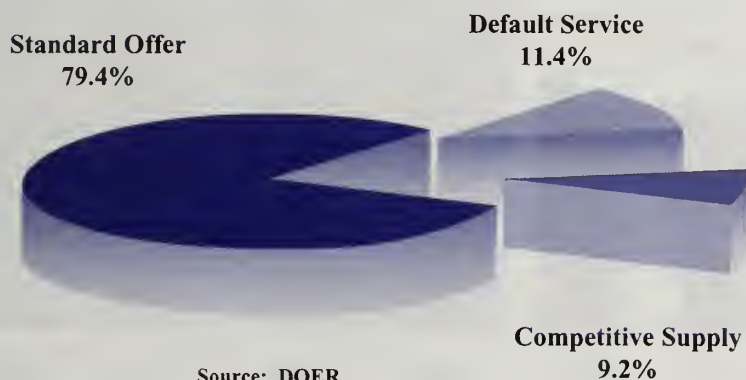
Source: Electric Power Annual Volume 1 1994-1999

Figure 2: 1999 Average Overall Electricity Prices by State (cents/kWh)



Source: Electric Power Annual 1999, Volume 1

Figure 3: Composition of Distribution Company Sales (kWh): December 1999



Electricity customers in Massachusetts receive one of three types of generation service: Standard Offer, Default Service, or Competitive Supply. The percentage of standard offer sales has dropped from 91.7% at the beginning of 1999 to 79.4% by December. In addition, several large commercial and industrial customers have switched to competitive suppliers, helping to drive competitive sales up from 1.3% to 9.2% of total sales over the course of 1999.

Generation Expected to Keep Up With Demand

Table 3: New Generation in Massachusetts

Name, Developer	Size	Location	Completed/ Expected
Dighton Power, Calpine	160 MW	Dighton	1999
Berkshire Power, PDC	275 MW	Agawam	2000
Millenium, PG&E	360 MW	Charlton	2000
Blackstone, ANP	580 MW	Blackstone	2001
Bellingham, ANP	520 MW	Bellingham	2002
Mystic Expansion, Sithe	1,600 MW	Everett	2002
Edgar Station Expansion, Sithe	750 MW	Weymouth	2002
Nickel Hill, Constellation	750 MW	Dracut	2003
TOTAL GENERATION	4,995 MW		

Source: ISO-New England, Annual Market Report 1999 - 2000

Open access to the transmission system and a new source of natural gas supply are two of the factors that are contributing to investment in new generation in New England. This expected increase in capacity should be sufficient to meet demand growth in the coming years. Figure 4 shows the historical trends and forecasted growth in generation capacity relative to peak demand in New England. As demand grows and older power plants are withdrawn, it is essential to continue developing new generation in the region. In 1999, 730 megawatts of new generation capacity were added in New England. An additional 1,250 megawatts of capacity is expected on-line in 2000 in New England. Table 3 lists the Massachusetts plants recently built, under construction, and planned through 2003.

Figure 4: Installed and Forecasted Generation in New England, 1999-2003

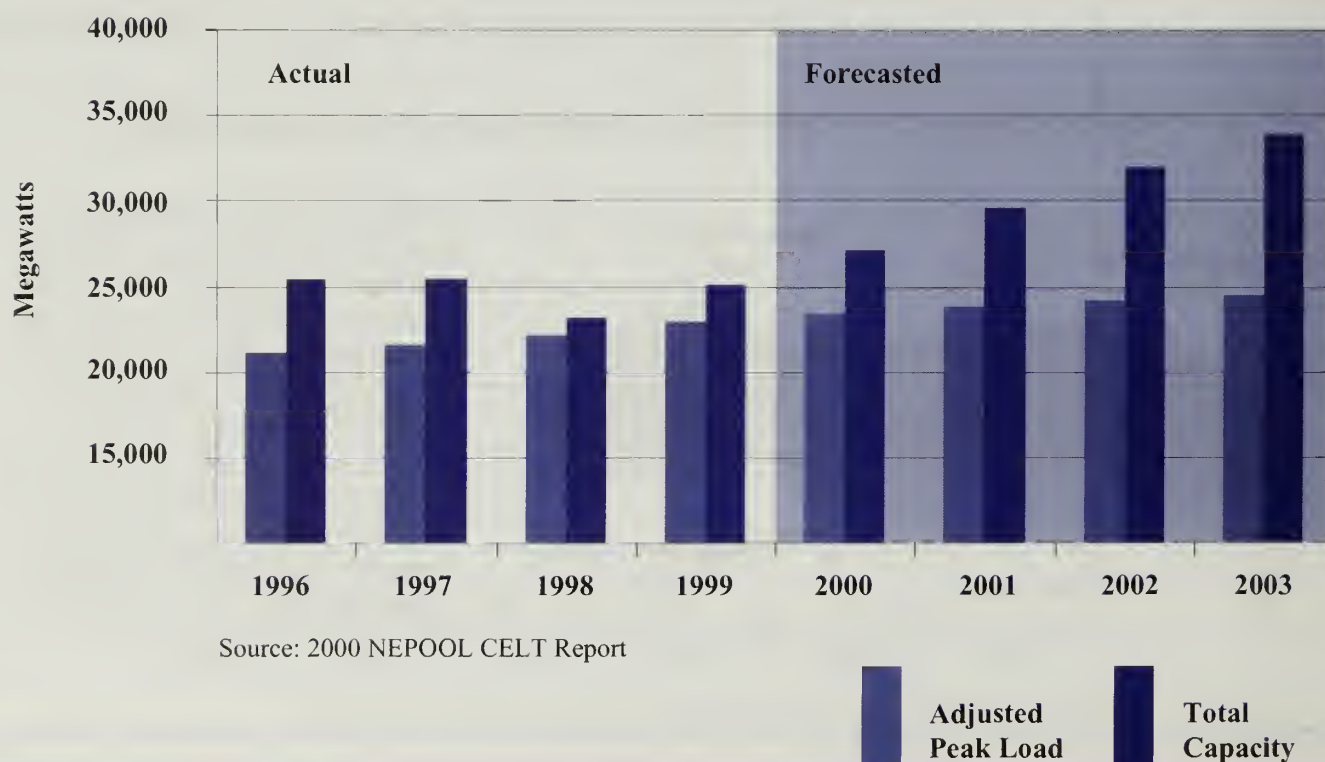
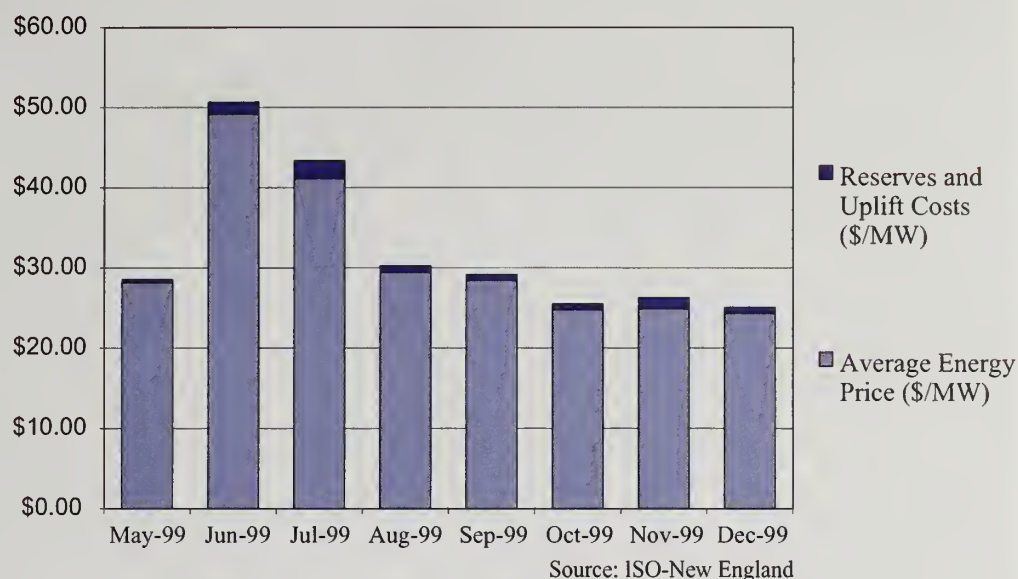


Figure 5: Monthly Wholesale Market Prices

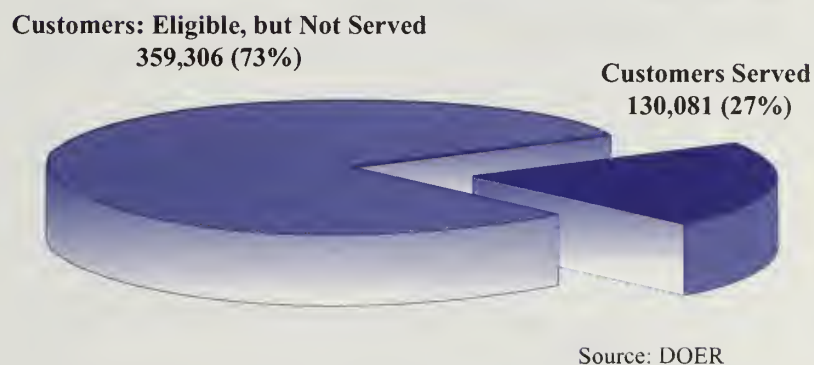
Figure 5 presents weighted average wholesale prices since the opening of the competitive market in May of 1999. Prices peaked during June due to unseasonably warm weather coinciding with scheduled power plant maintenance. The final five months of 1999 show prices within \$20-\$30 per megawatt hour. These relatively low and stable prices give hope that market mechanisms set by ISO-New England will work to keep a balance between supply and demand.



Electric Discount Rate

In accordance with the Act, DOER published *The Low-Income Outreach Guidelines* in December of 1998. The guidelines assist distribution companies in the development of effective procedures for identifying RDRE households and enrolling them as RDR customers. When compared to the DOER estimate of the total 1999 RDRE households (489,387), the distribution companies' reported figures show that approximately 27 percent were enrolled as RDR customers (see Figure 6). These low enrollment levels suggest that more needs to be done. Consequently, DOER will be reviewing its guidelines and will be working with stakeholders to identify procedural barriers to enrollment. DOER plans to file revised outreach guidelines with the Department of Telecommunications and Energy (DTE) in 2001.

Figure 6: 1999 Percentage of Residential Discount Rate Eligible Households Served



Outlook for 2000 Market Monitor

In the next Market Monitor, DOER will report on the significant events and issues of 2000, including:

FERC Order 2000

In its December 1999 order, the Federal Energy Regulatory Commission set a mandate for all regions in the United States to develop regional transmission organizations to control the operation of the power grid. DOER's 2000 Market Monitor will report on ISO-New England's efforts to comply with the requirements of the order.

Default Service Decoupling

2000 brought the decoupling of standard offer and default service rate structures in Massachusetts. In its set of orders under docket #DTE 99-60, the Department of Telecommunications and Energy allowed default service rates to reflect market prices, while keeping standard offer rates set by approved rate schedules.

E-Commerce and Retail Competition

In 2000, retail competition showed significant activity over the Internet. Several e-commerce operations

offered competitive electricity products to Massachusetts residents and businesses during the year. The 2000 report will examine successes and challenges of these innovative retail options.

Merger Outcomes

DOER will look at the final outcomes of the three mergers discussed in this year's report, and will survey the impacts of these mergers on the retail industry.

Fuel Prices and Electric Rates

Higher prices of natural gas and oil translated into higher costs for electric generation. 2000 saw public debate over whether or not utilities could pass these higher costs along to the customer.

Wholesale Market Reform

Through the identification of flaws in the wholesale power system, ISO-New England and NEPOOL drafted a proposal for the implementation of Congestion Management and Multi-Settlement Systems. The two entities filed the proposal with the FERC in the beginning of 2000.

The DOER report is a publication of the Commonwealth of Massachusetts
Office of Consumer Affairs and Business Regulation, Division of Energy Resources.
Suggestions, questions and input are invited. Send to: Market Development Team,
DOER, 70 Franklin Street, Seventh Floor, Boston, MA 02110.
Contact DOER staff members at (617) 727-4732.

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1999 Energy Efficiency Activities in Massachusetts

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Introduction

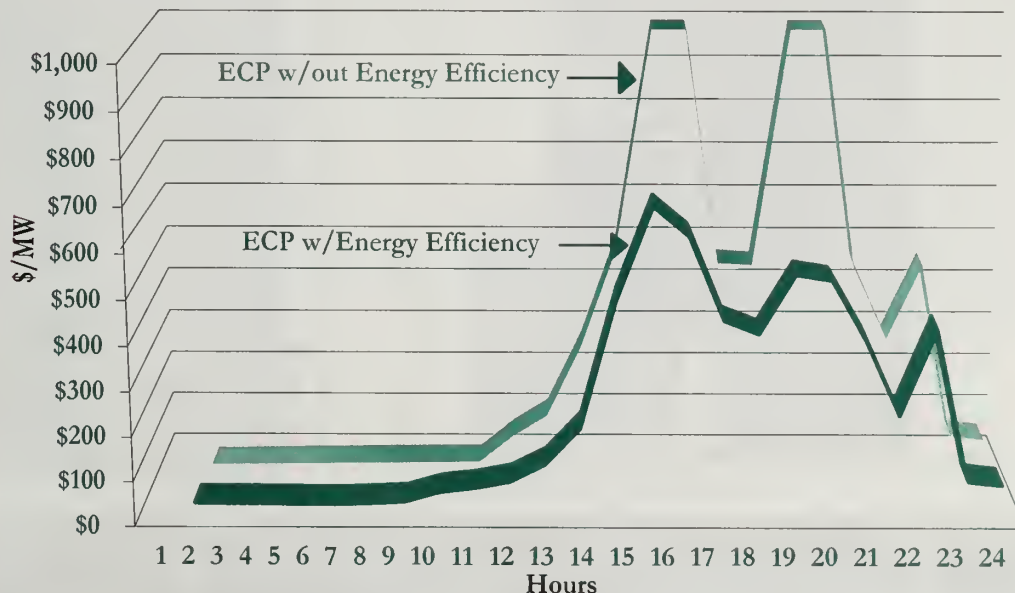
Massachusetts law requires customers of electric distribution companies to contribute a portion of their electricity charges to support activities that reduce electricity consumption. Enacted as part of the 1997 Electric Industry Restructuring Act, the policy recognizes that energy efficiency investments can: lower the overall cost of electricity without reducing comfort or convenience, lower the emission of harmful air and water pollutants, create jobs, and stimulate the economy. The investments provide for the installation of high efficiency lighting, motors, air conditioners and appliances; the construction of high efficiency homes and commercial buildings; and more.

This summary provides an overview of the Division of Energy Resources' (the Division) second annual legislative report on the status of energy efficiency in the Commonwealth.

1999 Highlights

- ❖ *Energy efficiency programs improved reliability and lowered wholesale electricity prices through demand reduction.*
- ❖ *Participants saved an estimated \$20 million in 1999 electricity costs.*
- ❖ *These savings are projected to grow to approximately \$285 million over the lifespan of the installed measures.*
- ❖ *Participating customers and ratepayers invested \$159 million to achieve the savings.*
- ❖ *The cost to conserve electricity is 60% less than the cost to buy it over the life of these energy efficiency measures.*


Figure 1: Potential Impact of Demand Reduction on
Wholesale Energy Clearing Prices (ECP) on June 7, 1999



Energy Efficiency Investments Improved Reliability and Lowered Wholesale Electricity Prices

The 1999 energy efficiency programs provided system-wide benefits by enhancing the reliability of the generating system and local transmission and distribution networks during peak usage periods. The programs also appeared to help avoid higher wholesale energy clearing prices. As an illustration of this potential, the Division estimates that on June 7, 1999 alone (over a 13-hour peak period), energy efficiency programs reduced demand by 115 MW, thus avoiding over \$6 million in additional costs to the system – costs that would likely have been passed on to all customers (see Figure 1 on the previous page.)

What is Energy Efficiency?



According to the Massachusetts Department of Telecommunications and Energy, energy efficiency is “the implementation of an action, policy or measure, which entails the application of the least amount of energy required to produce a desired or given output and includes demand-side management and energy conservation measures.” Improvements can include replacing equipment, such as lights, motors, appliances, and air conditioners with more efficient electrical equipment. Increased energy efficiency can also be realized through changes in behavior, such as turning off or dimming lights, & raising air conditioning thermostats (or lowering heating thermostats), in unused spaces.

Residential Customer Improves Efficiency of Home

Description: Mr. Roger Mason of Acushnet, residential single family home

Provider: Commonwealth Electric Company

Program: Residential High Use Program

Efficiency Activities: Installation of energy efficient lighting (bulbs and fixtures), air sealing, attic insulation, ventilation, and duct sealing measures.

Annual Savings: 5,981 kWh, or \$718

Lifetime Savings: 113,674 kWh, or \$13,000

Total Project Costs: \$3,903

Customer Rebate: \$447

1999 Program Participants Saved Money

Program participants saved over \$20 million on their 1999 electricity bills. Assuming that the energy efficiency equipment installed in 1999 remains in place for its full lifetime (an average of 14 years), total savings are projected to grow to approximately \$285 million. Average 1999 electricity bill savings for Low-Income participants was 10 percent, compared to 4 percent for all other Residential participants. Average savings for Small, Medium and Large Commercial and Industrial (C&I) customers were 7, 3, and 3 percent, respectively.

Table 1: 1999 Average Bill Impacts from Energy Savings

Customer Sector	Total Annual Bill Reductions for Participants	Avg. Annual Bill Savings
Low-Income	\$837,387	\$47
Residential	\$4,878,359	\$30
Small C&I	\$1,764,520	\$797
Medium C&I	\$2,030,042	\$1,089
Large C&I	\$10,871,997	\$7060
Total/Average	\$20,382,306	\$109

Source: Division of Energy Resources

Program participation levels in 1999 varied among the different customer sectors (see Table 2). Low-Income customer participation rates were less than residential levels, reflecting the need to improve outreach to households with incomes at or below 175% of the federal poverty line. Large C&I customers had the highest participation rate, reflecting that large electricity users reap substantial benefits from improving the efficiency of their buildings/facilities, and often participate in programs more than once during the year. Smaller C&I customers typically face greater barriers to investing in energy efficiency, and thus have lower participation rates. Over the past decade, however, the cumulative participation rate for Small C&I customers is between 25-35 percent.

Table 2: 1999 Energy Efficiency Program Participation

Customer Sector	# of Participants	Percent Served
Low-Income	17,867	4
Residential	163,978	10
Small C&I	2,215	2
Medium C&I	1,864	3
Large C&I	1,540	25
Total/Average	187,464	8

Source: Division of Energy Resources

Nortel Networks Improves Efficiency of its Chiller System

Description: Nortel Networks, Chelmsford, Multiple facilities to manufacture network solutions

Provider: Massachusetts Electric Company

Program: Design 2000 & Energy Initiative Programs

Efficiency Activities: Installed high efficiency lighting systems, and converted existing chiller plants to comprehensive chiller system in several facilities

Annual Savings: 1,818,263 kWh or \$145,146

Lifetime Savings: 36,322,070 kWh or \$ 2,902,920

Total Project Costs: \$1,286,945

Customer Rebate: \$965,634

Major Electricity Consuming Equipment

Residential: space heating and cooling, water heating, refrigeration, lighting, and household appliances

Commercial: lighting, heating ventilation and air conditioning (HVAC), motors, and refrigeration

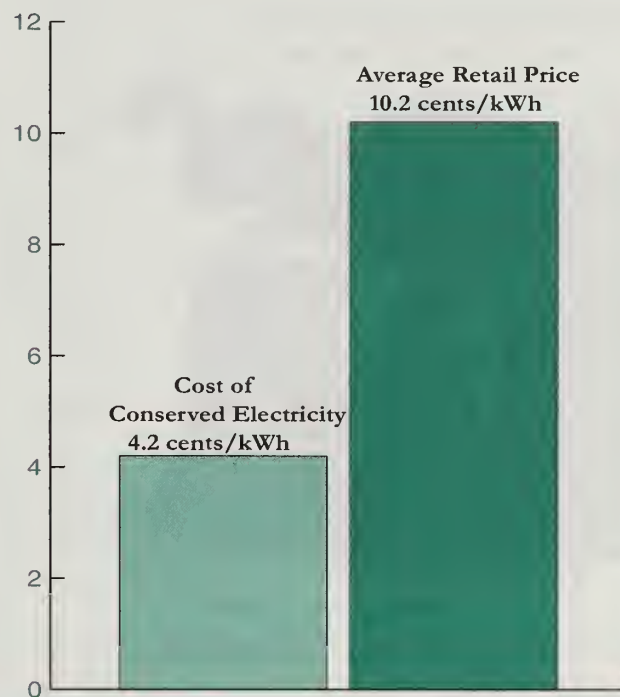
Industrial: lighting, HVAC, motors, boilers, air compressors, and process equipment

Source: Division of Energy Resources

Energy Efficiency is Cheaper than Buying Electricity

A total of \$159 million was invested in energy efficiency program activities in 1999 (comprised of \$125 million collected from ratepayers and \$34 million in participant costs), and an estimated 3,822 million kilowatt-hours will be saved over the lifetime of those investments. This equates to a cost of conserved energy of 4.2¢/kWh – almost 60 percent less than the projected average retail electricity price of 10.2¢/kWh over the same period.

Figure 2
Cost of Conserved Electricity vs. Average Retail Price



Source: Division of Energy Resources

Energy Efficiency Programs Improve Air Quality in Massachusetts and the Region

1999 ratepayer-funded energy efficiency activities reduced the amount of air polluting emissions released by electricity generating units and will likely continue to do so over the lifetime of the energy conservation measures installed. While it is difficult to attribute energy efficiency-derived emissions reductions to any specific Massachusetts generating facility, it is fair to say that overall emissions by the regional power system were reduced. The annual emission reductions for the three most critical pollutants – nitrogen oxides (NO_x), sulfur oxides (SO₂), and carbon dioxide (CO₂) – were 453 tons, 770 tons, and 145,000 tons, respectively. The NO_x emission reductions are equivalent to roughly the annual emissions of 34,000 passenger cars. The SO₂ emission reductions are equivalent to avoiding the burning of 55,000 tons of bituminous coal, the primary type of coal burned for electricity generation. The 145,000 tons of reduced CO₂ emissions are equivalent to the annual emissions of 29,000 cars and light vehicles.

Future DOER reports will expand this analysis by considering the long-term impacts of energy efficiency on air emissions. The factors to be reviewed include: uncertainty about long-term fuel prices; stricter state and federal standards for electricity generation; changes in the portfolio of New England power plants; and the effect that energy efficiency has on the dispatch of power plants.

Figure 3: Energy Efficiency Programs Reduce Annual Emissions



Source: Division of Energy Resources

Energy Efficiency Program Targets Economic Development Area

Description: Harvest Coop, Cambridge grocery store located in economic development area

Provider: Cambridge Electric Company

Program: Small C&I retrofit program

Efficiency Activities: Installed cooler economizers and controls to control thermostat zones for walk-in cooler, evaporator fans, electric door heaters and compressor run times

Annual Savings: 49,070 kWh or \$3,925

Lifetime Savings: 736,035 kWh or \$58,880

Total Project Costs: \$11,628

Customer Rebate: \$11,628

Increasing Jobs in the Commonwealth

One of the several benefits of energy efficiency activities is that they help to encourage local energy efficiency industries to grow in Massachusetts. For example, the Division's economic model estimates that 1999 ratepayer-funded investments in energy efficiency will provide 1,060 new jobs in Massachusetts, contributing \$72 million to the gross regional product. In addition, \$40 million in disposable income will be gained over the next decade from these jobs, most of which will be realized in the short-term. These jobs are concentrated in the services, retail trade and manufacturing sectors. In addition to creating jobs, 1999 energy efficiency programs targeted economic development projects throughout the state, in which participating customers received 100% rebate on projects to improve the efficiency of their facilities or operations.

Pittsfield Plastics Stays in Massachusetts

Description: Pittsfield Plastics, Pittsfield Manufacturing plant for plastic injected molded products, considered leaving Massachusetts

Provider: Western Massachusetts Electric Company

Program: Custom Services Program

Efficiency Activities: Evaluated energy use; analyzed and installed variable frequency drive on existing plastic injection molding machine; company committed to stay in Massachusetts and expand its operations.

Annual Savings: 82,700 kWh or \$3,270

Lifetime Savings: 1,240,500 kWh or \$49,050

Total Projects Costs: \$16,600

Customer Rebate: \$8,300

Energy Efficiency Programs were Cost-Effective in 1999

According to the methodology approved by the Department of Telecommunications and Energy (the Department), 1999 ratepayer-funded programs were cost-effective where benefits exceeded costs by a factor of 1.6. Under the methodology, benefits are defined as wholesale electricity and distribution and transmission costs avoided by distribution companies due to program savings over the lifetime of 1999 installations. Costs are those expended on program activities in 1999.

1999 developments included the Department's issuance of new Cost-Effectiveness Guidelines (Docket 98-100). These guidelines set out a more comprehensive methodology for quantifying other energy and non-energy benefits of programs. As a result, the cost-effectiveness of most programs will likely increase in the future. These additional benefits include increased worker productivity and property improvement for homeowners and businesses due to the installation of higher efficiency equipment. In addition, energy efficiency investments save distribution companies money by reducing costs related to bad debt expenses, and termination and connection charges-costs that would otherwise be passed on to all customers. Further, customers accrue resource savings in reduced natural gas and water bills. For example, the investment in an energy efficient clothes washer will not only reduce electricity costs to wash the clothes, but will also reduce water use and if applicable, the gas used to heat the water.

Other benefits are more difficult to quantify but are significant. These include creation of employment in the

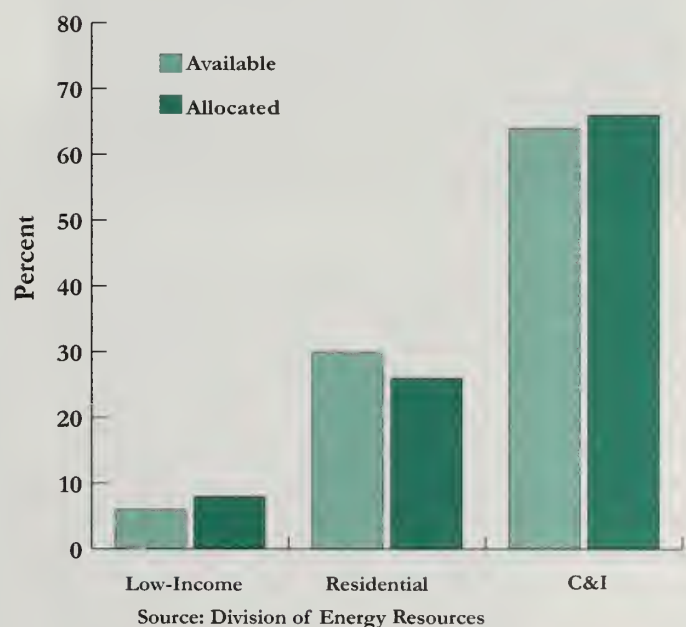
state, increased economic activity stimulated by energy cost savings, and improved health as a result of reduced air pollution.

Allocation of Funds to Different Customer Sectors Needs Improvement

The Act directs the Division to ensure that ratepayer funding for energy efficiency is equitably allocated among customer sectors. Equitable allocation is influenced by a specific requirement of the Act with respect to low-income customers (defined as 175% of the Federal Poverty Line). The Act directs that low-income program funding levels be at least 20% of the amount expended for residential programs, and no less than \$0.00025 per kWh (based upon total kWh sold to all customers).

On a percentage basis, 1999 available funds for customer sectors were: Low-Income (6%), Residential (30%), and C&I (64%). Funds were allocated 8%, 26%, and 66% respectively. The Residential sector fully subsidized the Low-Income sector, and slightly subsidized the C&I sector as well. The Division is working with Program Administrators to ensure that, in the future, both the residential and C&I sectors proportionately subsidize the low-income sector, given the mandated funding levels for this customer sector.

Figure 4: 1999 Available vs. Allocated Funds



Note: "Available funds" refers to 1999 collections from customer sectors and carry over funds from 1998. "Allocated Funds" refers to 1999 expenditures plus year end balances.

Fitchburg Housing Authority Participates in Low-Income Program

Description: Fitchburg Housing Authority, Fitchburg, 12-unit low-income apartment complex

Provider: Fitchburg Gas & Electric Company

Program: Low-Income Program

Efficiency Activities: Installed energy efficiency fluorescent bulbs and fixtures, automatic set back thermostats, and Energy Star rated refrigerators

Annual savings: 20,007 kWh or \$1,677

Lifetime Savings: 300,105 kWh or \$25,150

Total Project Costs: \$10,435

Customer Rebate: \$10,435

Program Activities are Balancing Short and Long Term Savings

Ratepayer-funded energy efficiency programs served two fundamental purposes in 1999: they provided immediate savings for participating customers, while also laying the foundation for future savings for all customers by transforming energy efficiency markets.

The greatest portion of 1999 energy efficiency expenditures (\$64.5 million) was invested in Retrofit programs (referred to as In-home Services for residential customers). These programs encourage the replacement of outdated and inefficient electrical or mechanical equipment, such as for lighting, heating and cooling systems, motors, energy management systems, and process redesign/improvement. Financial rebates are employed to persuade customers to upgrade to higher efficiency equipment.

Shaw's Supermarket Increases Efficiency in Seven Stores

Description: Shaw's Supermarkets Seven Boston area stores

Provider: Boston Edison

Program: Commercial and Industrial Program

Efficiency Activities: Retrofitted stores using "Smart Station" energy monitoring and reporting system; Re-commissioned store refrigeration, HVAC, and lighting systems.

Annual Savings: 598,400 kWh or \$48,650

Lifetime Savings: 9,000,000 kWh or \$729,750

Total Project Costs: \$144,235

Customer Rebate: \$47,000

The balance of total 1999 expenditures (\$15.5 million) was largely spent on Regional Market Transformation programs. While these programs provided some immediate savings to participating customers, more importantly, they targeted non-customer actors higher up in the market chain, seeking to change the production, purchasing, design, and stocking practices of manufacturers, builders, engineers, architects, and retailers over the long-term. By changing the fundamental behavior of these market players, there is the potential for much greater long-term energy efficiency than what can be accomplished through other types of programs. In the long run, this benefits all customers.

ENERGY STAR Lighting Program

Provider: All Massachusetts distribution companies, in coordination with other regional electric utilities and the Northeast Energy Efficiency Partnership.

Program: Regional market transformation program

Efficiency Activities: Goal of program is to transform the market to one that sustains availability of and demand for quality, energy efficient lighting products. Program has two components; point-of-purchase retail lighting component, and mail order catalog.

Customer Rebates: Program provided over 300,000 and 130,000 rebates for bulbs and fixtures, respectively, in 1999, totaling \$5.3 million in rebates to MA residential customers.

Progress to Date: Over the past two years, the program has helped to lower marketing costs and increase manufacturer and retailer participation in the ENERGY STAR Lighting Program.

The next largest portion of funding (\$25.6 million) was spent on Lost Opportunity/New Construction programs. These programs focus on encouraging investment in higher energy efficiency at the time of a naturally-occurring market event, such as construction of a new home or building, major expansion, renovation or remodeling, or replacement of failed equipment. These programs not only provided immediate and long-term savings to participants through rebates, but also targeted key market players (e.g., architects, designers, and builders) in order to change standard building practice and to upgrade building codes and standards, thus benefiting all customers over the long-term.

Summary of Funds Collected and Expended

A total of \$136.5 million was collected from ratepayers during 1999 to support energy efficiency activities. This represents 3.5% of distribution companies' 1999 revenues (note: these do not include competitive supplier revenues). In addition, \$10 million of unspent funds in 1998 were carried forward to 1999 program budgets, providing a total of \$146.5 million in Total Available Funds for 1999. Total expenditures for the year were \$125.0 million, leaving a year-end fund balance of \$21.5 million. This year-end balance resulted from: higher actual sales than forecasted sales (which were used to develop program budgets), thus producing a surplus

of funds; a portion of 1999 funds was *committed* to energy efficiency projects but not yet expended as of year-end; and some programs were not fully implemented since their introduction in 1998. Unexpended funds in 1999, plus interest, were carried forward to 2000. The Division anticipates that the 1999 fund balance and year-end balances for 2000 and 2001 will be committed to specific energy efficiency projects by year-end 2002.

Low-Income Customer Benefits from Improved Appliance Efficiency

Description: Mr. Roger Hills of West Newbury, single family home

Provider: Massachusetts Electric Company in cooperation with Community Weatherization Assistance Agencies

Program: Appliance Management Program

Efficiency Activities: Provided Mr. Hills with personalized information on electricity usage and installation of various energy savings measures, including replacement of refrigerator with a higher efficiency (ENERGY STAR) model, compact fluorescent light bulbs, and refrigerator coil brush

Annual Savings: 1,760 kWh or \$144

Lifetime Savings: 28,000 kWh or \$2,300

Total Project Costs: \$965

Customer Rebate: \$965

Changes in the Competitive Market for Energy Efficiency Services

The Division observed a decline in energy efficiency services offered by competitive retail suppliers. While most suppliers offered energy efficiency related services in 1998, fewer did in 1999. This may be due partly to limited activity in the electricity market in general, but also to certain barriers customers face (e.g., paying for upfront costs of energy audits). Greater emphasis on other energy cost savings strategies, such as load management services, may also be a factor.

Another measure of competition in the energy efficiency market is the extent to which ratepayer-funded program services (e.g., program implementation) were competitively procured. The Act requires that competitive procurement processes be used to the greatest extent practicable when delivering programs to Massachusetts' customers. These procurement processes benefit customers by providing lower, competitively set program costs, as well as by introducing innovative elements to program designs and/or implementation. In 1999, 76% or \$94.5 million, of all energy efficiency services were competitively procured outside of the administering distribution company.

Table 3: Massachusetts Energy Efficiency Goals

OVERALL STATEWIDE ENERGY EFFICIENCY GOAL:

Strengthen the economy and protect the environment by increasing the efficiency of energy use.

ENERGY EFFICIENCY OPERATIONAL GOALS:

- 1) Reduce the use of electricity cost-effectively.
- 2) Ensure that energy efficiency funds are allocated to low-income customers consistent with the requirements of the Act, and allocated equitably to other customer classes.

ENERGY EFFICIENCY PROGRAMMATIC GOALS:

- 3) Reduce customer energy costs by balancing short-run and long-run savings from energy efficiency programs.
- 4) Support the development of competitive markets for energy efficiency products and services.

Conclusions and Future Outlook

The Division concludes that 1999 energy efficiency program activities continue to meet or make progress toward the statewide energy efficiency goals. Program activities provided direct benefits to participating customers as well as indirect benefits to the Commonwealth as a whole.

The impact of 1999 program activities as well as experience from other years, will serve as the basis for the Division's recommendation to the Legislature during 2001 concerning the future of electric ratepayer-funded energy efficiency activities beyond 2002. In addition, the Division is currently undertaking extensive research that will inform its recommendation to the Legislature, including addressing the following key questions:

- 1) What energy efficiency opportunities remain in the Commonwealth for each customer sector?
- 2) To what extent can the remaining opportunities be achieved during the period 2003-2007, with and without ratepayer funded support?
- 3) What barriers do customers currently face to investing in energy efficiency?
- 4) To what extent are competitive markets providing energy efficiency products and services?

**This Executive Summary and the full 1999 Energy Efficiency Report
are available at DOER's web site.**

<http://www.state.ma.us/doer/>

**Suggestions and comments can be mailed to
energy@state.ma.us**

The DOER report is a publication of the Commonwealth of Massachusetts
Office of Consumer Affairs and Business Regulation, Division of Energy Resources.
Suggestions, questions and input are invited. Send to: Energy Efficiency Team,
DOER, 70 Franklin Street, 7th Floor, Boston, MA 02110-1313.
Contact DOER staff members at (617) 727-4732.

**COMMONWEALTH OF MASSACHUSETTS
DIVISION OF ENERGY RESOURCES
70 Franklin Street, 7th Floor
Boston, MA 02110-1313**



Electric Discount Rate Outreach and Eligibility Report

Findings and Recommendations

Division of Energy Resources
Commonwealth of Massachusetts
Office of Consumer Affairs and Business Regulation

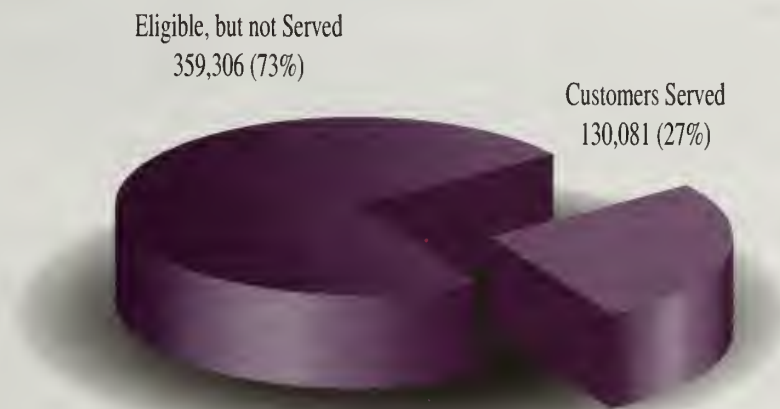
Introduction

The Massachusetts Division of Energy Resources (DOER) published Outreach Guidelines in December 1998 to assist electric distribution companies (DISCOs) in identifying households eligible for a discount on their electric bills. The DISCOs are NSTAR, National Grid, Western Massachusetts Electric and Unitil. This report reviews outreach activity conducted by the DISCOs during 1999-2001 to inform Residential Discount Rate Eligible households of the discount and to enroll them as discount rate customers. It also analyzes the results of these efforts and recommends several actions to increase enrollment.

Highlights

- ◆ In 1999, 27% of Eligible Households received the Electric Discount Rate.
- ◆ DISCO annual reports submitted to DOER show overall compliance with Outreach & Eligibility Guidelines.
- ◆ Computer matching between DISCOs' customer lists and Massachusetts state benefit agencies is becoming more commonplace.
- ◆ DOER recommends expanding outreach effort to reach more eligible households.

Figure 1: Percentage of Residential Households Receiving the Discount Rate in 1999



Source: DOER

A PUBLICATION OF
THE MASSACHUSETTS
DIVISION OF ENERGY
RESOURCES

Winter 2001/2002

The Commonwealth
of Massachusetts

Jane Swift
Governor

Jennifer Davis Carey
Director, Office of
Consumer Affairs and
Business Regulation

David L. O'Connor
Commissioner, Division of
Energy Resources

For more information visit
DOER's Website
www.mass.gov/doer
or contact us at
1-800-351-0077

Electric Discount Rate Eligibility and Verification

M.G.L. c. 164 § 1F(4)(i) defines eligibility for the electric residential discount rate (RDR). To receive the discount rate, Massachusetts' households must meet two criteria. First, a household member must receive a means-tested public benefit (such as Transitional Assistance) or be eligible for the Low-Income Home Energy Assistance Program (LIHEAP). Second, total household income cannot exceed 175 percent of the federal poverty level (FPL).

Figure 2 outlines the eligibility process.

The DISCOs have two options as to how they verify discount eligibility for their customers. Under Option One, and in order to protect client confidentiality, a mailing house acts as an intermediary between the DISCO and public agency, verifying discount eligibility with agency client status. The DISCOs then assign the customers to the RDR. M.G.L. 164 § 1F(4)(i) defines this option:

“Outreach may include establishing an automated program of matching customers accounts with lists of recipients of said means-tested public benefit programs and based on the results of said matching program to presumptively offer a low-income discount rate to eligible customer so identified...”

Under Option Two, the public agency annually notifies its clients via postcard of their eligibility for a discount rate. The card includes simple application instructions and information on where to return the card along with their monthly electric bill. The burden is on the client to send in the application form. The utility processes the application for the client. To date, the DISCOs have all elected to use Option Two.

Outreach Guidelines

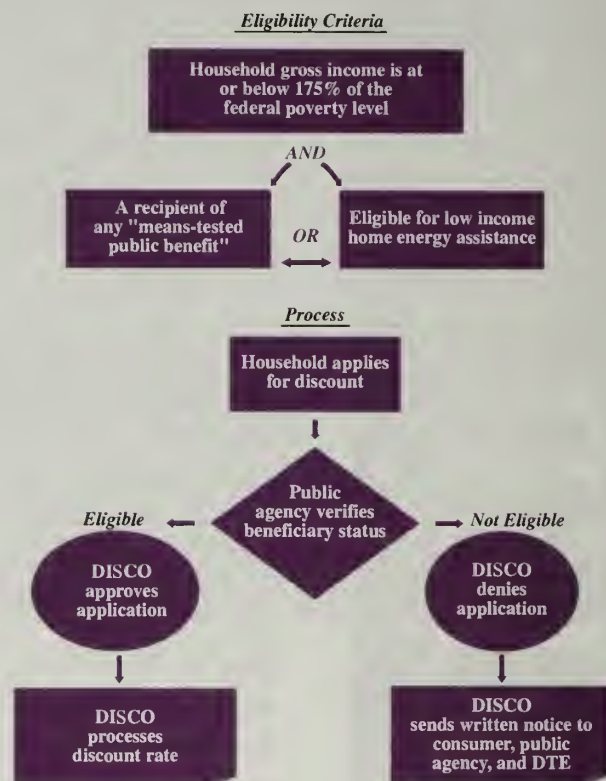
In addition to reporting annually to DOER on their outreach efforts and results, the DISCOs must comply with the following *Discount Rate Outreach Guidelines*:

- Work with the Department of Revenue (DOR) Child Support Division to inform clients of the rate discount.
- Adopt “Discount Rate” as the new rate name and change all financial hardship forms to reflect it.
- Provide quarterly notification regarding the discount rate via bill inserts and newsletters.
- Set up point-of-purchase displays with the state and federal agencies that offer qualifying benefits.
- Work with schools/camps to reach families in the Head Start and National School Breakfast and Lunch Programs.
- Establish a separate toll-free telephone number for discount rate inquiries.

Outreach Compliance

During 1999, while most of the DISCOs developed point-of purchase displays, not all worked with DOR or schools/camps to reach School Breakfast/Lunch and Head Start Program households. Massachusetts Electric (MECO, a National Grid Company) and Western Massachusetts Electric (WMECO) fully complied with both of these guidelines. In 2000, the DISCOs expanded their point-of-purchase displays to more community agencies. However, as in 1999, they made little progress

Figure 2: Outline of Eligibility Criteria & Application Process



implementing the DOR and School Lunch guidelines. Preliminary data in 2001 suggest that some DISCOs increased community outreach activities. Unitil met with several retail chains to request distribution of RDR pamphlets to employees and customers, while MECO ran a media campaign. However, full compliance with all guidelines is incomplete.

Enrollment Results

RDR customer data for 1997-2000 (Figure 3) show a total enrollment decrease in 1998 over 1997. Multiple implementation demands placed on DISCOs during the first year of deregulation may account for the reduction. Enrollment increased modestly in 1999 over 1998, approaching the 1997 (pre-deregulation) level. Enrollment decreased again in 2000 over 1999.

Figure 3: Total Number of Discount Rate Customers

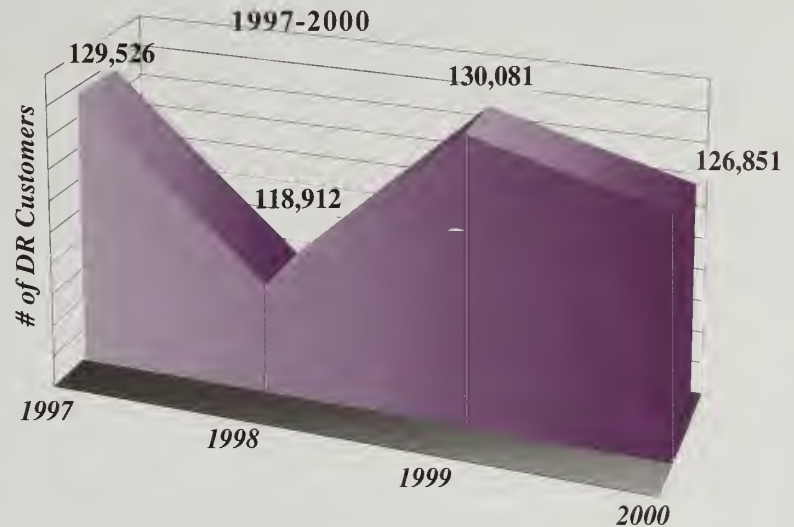
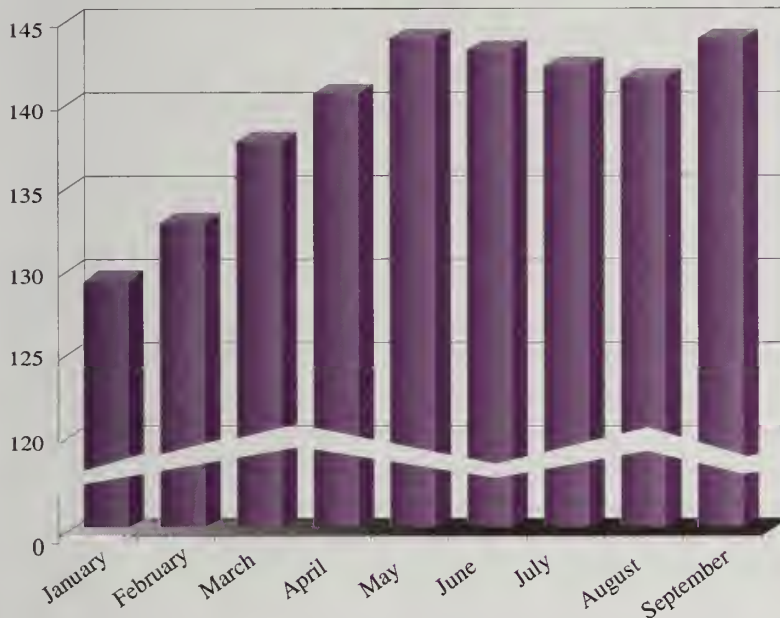


Figure 4: Total Discount Rate Customers in 2001 by Month (000s)

Source: Distribution Companies' Year End Reports 1998-2000



DOER's 2001 customer migration data show a monthly increase in DISCO RDR total customers (Figure 4) through the first three-quarters of 2001 (January-September). These RDR totals are consistent with 1999 levels. Several factors influenced this level. Most likely, the increase in electricity bills associated with higher fuel costs resulted in more customers seeking assistance. Increased community outreach activities by DISCOs during the winter may have also contributed to this.

In an effort to assess the impact of outreach activities upon actual enrollment, DOER estimated (for 1999) the total universe of Massachusetts' households eligible for the discount rate and compared it to the actual number of RDR

customers. Using MISER (Massachusetts Institute for Social and Economic Research) census data for 1998-1999, DOER estimated the number of households living at 175 percent of the Federal Poverty Level excluding the 13 percent of households served by municipal utilities rather than DISCOs. Accordingly, DOER estimates that 489,387 households were eligible for the discount rate in 1999 versus 130,081 (27 percent) households actually enrolled (Figure 1). This penetration rate is comparable to Massachusetts' Low-Income Home Energy Assistance Program (LIHEAP), which reached about 25 percent of its eligible households in 1999.

Recommendations

DOER recommends the following actions be taken by DISCOs as expeditiously as possible:

1. Implement a computer matching program for eligibility verification.

To date, all the DISCOs have opted to verify eligibility through public benefit agencies rather than by using computer matching through an independent mailhouse. This places the burden on the client (benefit recipient) to return the card, rather than on the DISCO to sign up the clients. Further, the verification process is inconsistent across state agencies, which use dissimilar procedures and methods for information management.

Since most DISCOs use electronic data transfers already to assist eligibility verification, this recommendation would streamline the process and remove the onus from the customer. The Department of Transitional Assistance and LIHEAP already use this process, though not for all qualifying benefits. This system should be implemented throughout all state agencies that operate public benefit programs.

New York State implemented a computer matching program using Verizon as their program administrator. Verizon offers the federally mandated Lifeline program, providing discounted telephone rates for income eligible customers. To ensure that all customers receiving public benefits receive Lifeline, New York has an agreement with Verizon to get an independent third party mailhouse to match Verizon's customer names against the named public beneficiaries. State and federal benefit agencies execute privacy protection agreements with the mailhouse. Once Verizon receives the matching names, it automatically enrolls the customer in the Lifeline program and sends a card informing them of the enrollment. The customer then has the option to opt-out of the program if they so desire. The opt-out mechanism eliminates the individual sign-up process for the electricity discount. It also simplifies the annual eligibility verification efforts.

2. Expand outreach efforts beyond social service agencies.

Outreach efforts thus far have focused primarily on social service agencies and their clients to reach low-income customers. DOER recommends that distribution companies expand their outreach strategies to include the Department of Revenue, local media, and other community outlets. A customized outreach plan that incorporates the guidelines while using community resources seems to be the best means to inform customers of the availability of the RDR.

3. Institute a universal waiver to allow DISCOs and social service agencies to exchange customer/client information.

Other states have already implemented such an approach. Sacramento Municipal Utility District (SMUD) in California uses a universal waiver, which allows SMUD and social service agencies to exchange customer/client information for energy efficiency programs. The universal waiver eliminates the customer application process. After exchanging the customer information with the social service agency, SMUD determines customer eligibility. SMUD then contacts the customer to set up delivery for home energy efficiency services. Legislation may be required to address privacy protection concerns surrounding the exchange of data from state agencies.

Conclusion

The Division of Energy Resources believes the distribution companies can make substantial progress toward increasing enrollment of RDR eligible customers by implementing the proposed recommendations. The Department of Telecommunications and Energy (DTE) is currently investigating ways to increase the penetration rate for electric, gas and telephone discount rates (D.T. E. 01-106). By including these recommendations in its findings, DTE can assist the DISCOs in this important endeavor. DOER is fully committed to working with the DTE and the DISCOs to ensure the viability and success of the recommendations. Finally, DOER will continue to monitor the DISCOs' activities through their annual reports and may propose further recommendations in the future.





Massachusetts Petroleum Infrastructure Report

Division of Energy Resources

Commonwealth of Massachusetts

Office of Consumer Affairs and Business Regulation

Introduction

To meet its space heating, electric generation and transportation needs, New England uses more petroleum products than the United States as a whole (47 percent vs. 39 percent, respectively), with all of its supplies coming from domestic and foreign imports. Over many decades, the oil industry and its infrastructure have served New England and Massachusetts markets effectively and efficiently.

However, recent events, including heating oil and diesel fuel price spikes, periodic surges in gasoline prices, and increased terrorism concerns prompted the Massachusetts Legislature to direct the Commonwealth's Division of Energy Resources (DOER) to undertake an assessment of the state's petroleum-based fuel supplies and distribution systems. DOER commissioned ICF Consulting to conduct a comprehensive review of New England and Massachusetts petroleum supplies and infrastructure. This report identifies five potential vulnerabilities for the State and region based on the ICF review and recommends various actions to address them.

Figure 1: Massachusetts Petroleum Imports by Source, 1999



Source: U.S. Army Corps of Engineers,
Waterborne Commerce of the United States, 2000

Findings

◆ *The Chelsea Creek oil terminals in Revere, MA represent the largest storage center for petroleum products in Massachusetts. Navigational problems associated with the Chelsea Street Bridge pose a continuing risk of disruption to regional petroleum supplies.*

◆ *Massachusetts relies heavily on marine and road transportation to receive its petroleum supplies. This makes the state susceptible to supply disruptions during periods of severe winter weather and low inventories.*

◆ *Potential interruptions in the supply of jet fuel create a risk to the operations of regional airports and would impact New England's economy in immediate and significant ways.*

◆ *Heating oil supplies are adversely affected by declining storage capacity and increased use of heating oil by power plants during times of peak electricity demand.*

◆ *Environmental requirements for gasoline and diesel fuel vary by state. This variation necessitates more storage capacity, which reduces storage capacity for other fuels.*

Background

New England depends exclusively on imports to meet its petroleum needs because it has no indigenous fossil fuel resources or refining capacity. To receive products, New England relies most heavily on marine transportation. Among the New England states, Massachusetts receives the largest share of imports (See Exhibit 1).

In 1999, New England ports received about 11 billion gallons of petroleum fuels, with Massachusetts ports receiving almost 4 billion gallons of the total.

Of the six New England states, Massachusetts consumes the largest share (42 percent) of gasoline. It also represents 44 percent of Massachusetts imports.

Heating oil issues are unique to New England and the Mid-Atlantic regions, which consume 70 percent of the heating oil produced. However, heating oil use is declining when compared to natural gas. In Massachusetts, heating oil use declined from 44 percent of households in 1990 to 39 percent in 2000. Demand shifted from fuel oil to natural gas, which rose from 38 percent in 1990 to 43 percent by 2000. Nevertheless, 21 percent of Massachusetts petroleum imports in 1999 were used for residential heating.

Imports of diesel fuel to Massachusetts in 1999 were 11 percent of all petroleum imports. Demand for diesel fuel, used largely by trucks transporting goods, reflects the state of the economy. New England demand grew by 13 percent from 1995-2000. The Massachusetts diesel demand average is 38 percent of the total New England demand. Figure 2 shows a breakout of petroleum products for Massachusetts by product type.

Nearly 75 percent of New England's waterborne shipments arrive at four ports: Boston, New Haven, Providence, and Portland. According to 1999 data, the port of Boston handles the largest portion of the region's petroleum supplies (Figure 3). Boston accounts for 32 percent, with nearly 3.6 billion gallons arriving in 1999. This represented nearly 92 percent of total Massachusetts waterborne shipments.

Exhibit 1: NE Petroleum Imports by Source

New England Imports:	Massachusetts Imports:
Domestic 58%	Domestic 46%
Foreign 42%	Foreign 54%

Primary Foreign Sources:

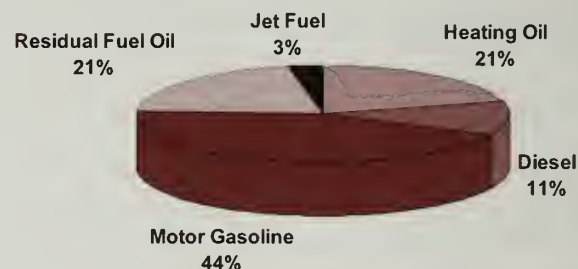
Canada
Venezuela
U.S. Virgin Islands

Marine-Based Imports by State (1999)

Connecticut	28%	New Hampshire	5%
Maine	15%	Rhode Island	16%
Massachusetts	36%	Vermont*	0

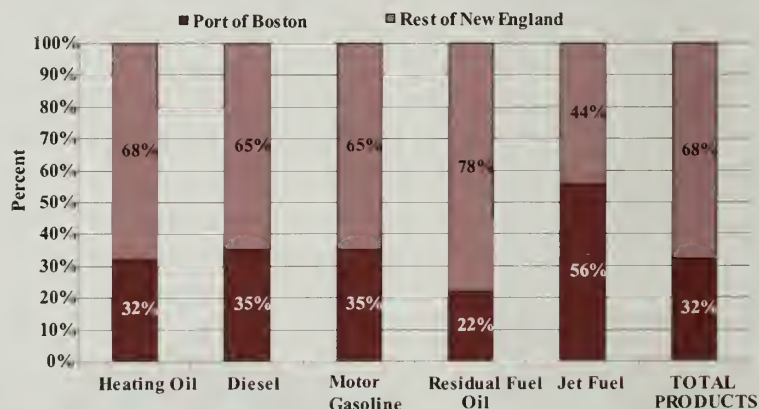
*With no coastal ports, Vermont relies on tanker trucks and rail transport to move products from Albany, Montreal, Springfield, and Portland.

Figure 2: Massachusetts Petroleum Product Supply by Product Type, 1999



Source: U.S. Army Corps of Engineers, Waterborne Commerce of the United States, 2000

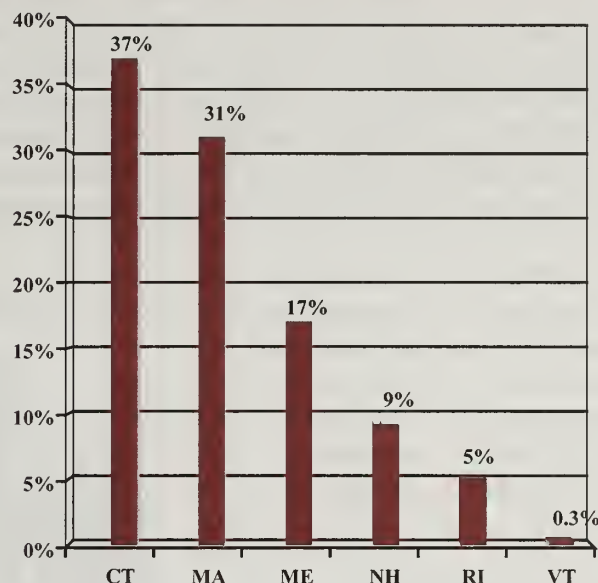
Figure 3: Port of Boston Receipts as a Percentage of Total New England Supply, 1999



Source: U.S. Army Corps of Engineers, Waterborne Commerce of the United States, 2000

Given its isolation from the national oil pipeline system, New England requires higher-than-average storage capacity compared to other regions of the United States. Much of this capacity is devoted to distillate fuels and is driven by heating oil demand in all sectors and diesel fuel demand in the transportation sector. Wholesale suppliers operate New England bulk terminals, with an estimated 950 tanks and a total storage capacity of about 2 billion gallons (50 million barrels). Connecticut and Massachusetts comprise nearly 70 percent of New England's total storage capacity (Figure 4).

Figure 4: New England Terminal Storage Capacity by State



Source: ICF Consulting

Following the national trend, storage capacity for petroleum products is declining in Massachusetts. For example, over the last five years Coastal Oil New England facilities in South Boston and Chelsea closed. With a combined capacity of 103.3 million gallons (2.46 million barrels), these two closures represent a

14 percent loss in Massachusetts capacity. These closures are somewhat offset by a general decline over the last decade in the amount of fuel stored due to changes in inventory management and shipping efficiencies. This same decline in the amount of fuel stored may be more efficient and produce savings for consumers. However, reduced amounts of fuel in storage, especially during severe winter weather, increases the risk of fuel shortages and price spikes.

As of 1999 Massachusetts terminal storage capacity (Figure 5), 650 million gallons, is concentrated in three major cities: Revere (29 percent), Everett (18 percent), and Chelsea (14 percent). In Western Massachusetts, Springfield maintains over 19 million gallons of capacity (3 percent).

Figure 5: Massachusetts Terminal Storage Capacity



Source: ICF Consulting

Issue 1: Chelsea Creek Terminal and Bridge

Despite recent facility closures, Chelsea Creek terminals continue to play a vital role in statewide and regional petroleum shipments, representing 14 percent (298 million gallons) of New England's capacity and 46 percent of Massachusetts capacity. Chelsea Creek and its terminals are also an integral part of the Massachusetts petroleum supply infrastructure. Four major terminal locations along the Chelsea Creek, a waterway of the Port of Boston, house approximately half of the storage capacity in the Commonwealth. Three terminal areas upriver of the Chelsea Street Bridge can hold 246 million gallons or 38 percent of the state's storage capacity. A fourth terminal, located at the entrance to the bridge can hold 52 million gallons.

Navigational problems associated with the Chelsea Street Bridge put regional petroleum supplies in jeopardy. When elevated this draw bridge affords a narrow (96-foot) channel for tankers to navigate from East Boston to Chelsea (see Figure 6). In its current condition, the Chelsea Street Bridge cannot accommodate large, double-hulled ships in the narrow space between its abutments. Tankers currently pass through with very tight clearance on each side. When ships pass through the bridge the probability of an accident is quite high. Any bridge mishap or incident on the waterway could significantly delay shipments. Industrial, commercial, and residential petroleum users throughout the region could subsequently experience adverse economic consequences.

Figure 6: Chelsea Street Bridge

**RECOMMENDATION**

Massachusetts should support efforts to seek federal funds to replace the Chelsea Street Bridge. Congress can appropriate funds to replace the bridge under the federal Truman-Hobbs Act.¹ To support this objective, DOER will provide state and federal officials with energy supply and infrastructure data regarding Chelsea Creek oil terminals.

If unable to mitigate the problems at Chelsea Creek, the New England states should consider upgrading regional ports and petroleum facilities. In addition, DOER should continue to monitor New England's storage capacity availability.

Issue 2: Marine and Road Transportation

Although three regional oil pipeline systems serve the New England market, they are not connected to a major interstate oil product pipeline. Consequently, Massachusetts and New England rely on a complex system of primary and secondary distribution methods. Because the region relies so heavily on marine and tanker truck transportation for its oil distribution, New England is susceptible to disruption in the supply of

¹The Act provides for federal funding in the U.S. Coast Guard's budget if the Commandant of the U.S. Coast Guard determines that a bridge constitutes an unreasonable obstruction to navigation, and if the benefits to navigation from replacing the bridge equal or exceed the cost of replacement.

petroleum products (President Bush's National Energy Policy recognized New England's vulnerability associated with reliance on marine transportation).

Severe winter weather can cause transportation delays and supply disruptions. Frozen harbors and waterways or a storm at sea can delay supplies, often when needed most. If product stocks are already low, prices can spike as demand outpaces supply. In addition, pending changes in tanker vessels entering US waterways may severely impact East Coast ports, like Boston. Section 2015 of the Oil Pollution Act of 1990 (OPA90) requires vessels operating in U.S. waters to have double hulls by 2015. This will add 2-5 feet to the draft and up to 12 feet to the width of the tankers. These new tankers will face navigational challenges in ports with width and depth constraints. Massachusetts waterways are at risk of not being able to accommodate the new vessels, further exacerbating potential supply problems.

In addition to marine transport and primary storage terminals, the petroleum infrastructure depends on an elaborate secondary network of fuel oil dealers, gasoline stations, and small bulk terminals to redistribute products to customers. Regional pipelines assist this network by delivering products to inland bulk terminals in New England. These pipelines originate in New Haven, Providence, and Portland. Waterborne shipments, initially received into those ports, feed these regional pipelines.

Given its proximity to two pipeline systems, Springfield plays a vital role in petroleum distribution in central and western Massachusetts. The Buckeye pipeline serves those terminal facilities via smaller spur lines at several junctions, moving an estimated 2 million gallons of petroleum each day. Gasoline accounts for nearly half of total movements, while jet fuel, diesel, and heating oil make up the remaining 50 percent.

Tank trucks usually distribute products from waterside and inland terminals. Petroleum distributors invest in tank trucks to meet business needs for normal or average weather conditions. During severe weather events, demand spikes due to an increase in consumer usage, creating longer work hours and more trips for tanker trucks and their drivers. Consequently, when an unusually severe winter occurs, distributors may encounter not only volume-lifting restrictions from their supplier (due to short supply), but also hazardous road conditions and restrictions on the number of hours drivers can work.

RECOMMENDATION

Given the heavy reliance on marine transportation, federal funding for the timely use of Coast Guard icebreakers is essential to keeping waterways open for marine shipments. In addition, federal efforts to maintain the Northeast Heating Oil Reserve provide a critical buffer against supply delays or disruptions.

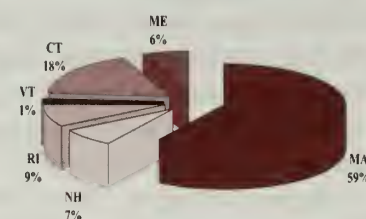
In a true emergency shortage, temporary waiver of restrictions on use of available tankers under the Jones Act² could also offer added flexibility to bring in additional supplies in a timely manner. Additionally, during a supply shortage or emergency, the temporary lifting of federal and/or state restrictions for truck driver hours can expedite the movement of petroleum products.

² The Act stipulates that only U.S. flagged vessels with U.S. crews can travel between multiple U.S. ports. Foreign vessels attempting to serve multiple ports, such as New York and Boston, require a waiver from U.S. Customs (Merchant Marine Act of 1920, 46 App. USC 883, §27).

Issue 3: Jet Fuel

Jet fuel represents 2 percent of total products entering New England (1999) and 3 percent of products entering Massachusetts ports. In New England, Massachusetts is the largest consumer of jet fuel, averaging about 60 percent of total demand (see Figure 7). In 1999, almost 100 percent of the jet fuel entering Massachusetts ports arrived in Boston, with 37 percent going to Chelsea Creek terminals. Boston's Logan International Airport the nation's eighteenth busiest airport in terms of passenger volume, drives jet fuel demand.

Figure 7: New England Jet Fuel Demand by State, 1999



Source: ICF Consulting

Jet fuel moves via pipeline from a Chelsea Creek terminal to Logan Airport, where the jet fuel facility can hold up to 1.8 million gallons (43,000 barrels) in each of four tanks. Generally, the airport capacity represents a 5-7 day supply based on current airport demand. Within the airport, a 4-mile 18" pipeline transports fuel. Since Logan contributes \$5 billion per year to the Massachusetts economy, any disruption to jet fuel supplies can cause serious economic problems. There are no substitutes for jet fuel. If not available or in short supply, prices can rise and in the extreme, planes cannot fly.

RECOMMENDATION

DOER should examine in greater detail the jet fuel supply infrastructure in New England, the potential for disruption of jet fuel supplies, especially for Logan Airport, and work with appropriate agencies and the oil industry to develop contingency plans to address an interruption in jet fuel supplies.

Issue 4: Interruptible Natural Gas Contracts

Demand for residual fuel oil, used primarily by electric power plants, has shown the most fluctuation in use among petroleum products. In recent years, as new gas-fired power plants in the region changed electric power generators' fuel-purchasing patterns, demand within the sector fluctuated. In New England, demand for residual fuel decreased by 25 percent from 1995 to 2000. Usage varied greatly from year to year usually in inverse proportion to the price of natural gas. Of the total New England demand, Massachusetts demand fluctuated from a low of 13 percent in 1999 to a high of 46 percent in 1997.

Some electric power plants and many large industrial and commercial customers have the ability to switch their boilers back and forth between oil and natural gas. Interruptible contracts allow these buyers of gas to use fuel oil as a backup supply. The ability to burn either fuel allows these facilities to switch between fuels to take advantage of price differentials. Yet, natural gas, like heating oil, is a winter peaking fuel. During periods of severe winter weather, natural gas shortages, or price spikes, the dual-fuel plants may switch from gas to heating oil or residual fuel oil. Without backup fuel inventories in place, this switching threatens to deplete heating oil supplies when residential heating oil demand is at its highest.

RECOMMENDATION

Massachusetts and the other New England states should encourage firm gas supply contracts for power plants that burn gas, and encourage the maintenance of minimum oil inventories for "dual-fuel" plants. Currently, New York and New Jersey require backup oil supplies be maintained by industrial customers and electric generators that otherwise burn gas.

Issue 5: Gasoline and Diesel Fuel Blends

In the past, gasoline demand in New England peaked during the summer. This pattern allowed refiners to decrease gasoline production in late summer/early fall and begin production of heating oil and diesel fuel in time to meet winter demands. Recent national data suggest that gasoline demand may be moving from a seasonal to more year-round demand pattern. Massachusetts and New England both appear to be following the national trend. This trend, if it continues, could create shortages of heating oil and diesel fuel as refineries extend the production of gasoline later into the fall.

Currently, state environmental rules require Massachusetts, Connecticut, Rhode Island, and most of southern New Hampshire to sell reformulated gasoline (RFG). The rest of New England sells conventional gasoline. This means that terminals must separately store different gasoline blends, which reduces storage capacity for other fuels. Many states are also introducing legislation to ban the use of MTBE (methyl tertiary-butyl ether). If each state passes a different version of a MTBE ban, serious storage issues could emerge.

In addition, United States environmental regulations for sulfur content in on-road diesel fuel will become stricter in 2006. There are concerns that the capital investments required to meet the new standards could drive some domestic refiners out of business. Canadian fuel specifications are moving in the same direction as those of the US. Given that New England obtains a high proportion of fuels from Canadian refineries, there is uncertainty about whether Canada will produce enough ultra-low sulfur diesel fuel to maintain its exports. Ultimately the market may solve this problem by using price to allocate scarce diesel fuel supplies.

RECOMMENDATION

It is important that regulators in the New England states work together to promote consistency in fuel specifications to meet environmental standards. New England energy officials should continue to monitor the availability of gasoline and diesel fuel.

Conclusion

Massachusetts and New England benefit from having an effective and efficient system for the delivery of the petroleum products necessary for safety, comfort, and economic well being. However, these important systems are potentially vulnerable to short and long term disruptions. This report identifies five of the most significant potential threats to this infrastructure.

One of the most serious vulnerabilities concerns issues related to the Chelsea Creek storage terminals. The outdated Chelsea Street drawbridge along the waterway threatens access to this facility, which stores 46 percent of the petroleum products used in the Commonwealth at any given time. Any disruption at these terminals would have an immediate economic impact in the entire region. The Commonwealth must continue to work with other New England states to secure federal funding to rebuild this bridge.

Additionally, changing demand patterns for gasoline, diesel fuel, and residual fuels can impact the availability, storage, and final cost of other fuels, particularly heating oil. Because New England relies more heavily on heating oil for winter heating than other areas of the country, it is important that all of these states work together to ensure consistency in gasoline blends across the region, which will free up more storage capacity for the Northeast Heating Oil Reserve.

Finally, without direct pipeline connectivity to America's petroleum supply and refining centers, Massachusetts and New England rely solely on marine and road transportation to deliver petroleum fuels. This reliance makes continued monitoring of the marine and road transport infrastructure systems imperative.

Recommendations

- ◆ *Reconstruct Chelsea Street Bridge as soon as possible to allow safe passage by petroleum-carrying tankers.*
- ◆ *Use icebreaking ships whenever necessary to keep regional waterways open for fuel deliveries.*
- ◆ *Maintain Northeast Heating Oil Reserve.*
- ◆ *Determine the potential for disruption of jet fuel supplies, especially to Logan Airport, and develop contingency plans.*
- ◆ *Encourage owners of natural gas-burning power plants to secure firm natural gas supplies.*
- ◆ *Promote consistency in fuel specifications to meet environmental standards among New England states.*

The DOER report is a publication of the Commonwealth of Massachusetts
Office of Consumer Affairs and Business Regulation, Division of Energy Resources
Suggestions, questions and input are invited. Send to: Reliability Team,
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**COMMONWEALTH OF MASSACHUSETTS
DIVISION OF ENERGY RESOURCES**

**70 Franklin Street, 7th Floor
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2001 Energy Efficiency Activities in Massachusetts

Division of Energy Resources
Commonwealth of Massachusetts
Office of Consumer Affairs and Business Regulation

Introduction

Massachusetts law requires customers of electric distribution companies to contribute a portion of their electricity charges to support activities that reduce electricity consumption. Enacted as part of the 1997 Electric Industry Restructuring Act ("the Act"), the policy recognizes that energy efficiency investments can: lower the overall cost of electricity without reducing comfort or convenience, lower the emission of harmful air and water pollutants, create jobs, and stimulate the economy. The investments provide for the installation of high efficiency lighting, motors, air conditioners and appliances; the construction of high-efficiency homes and commercial buildings; and more.

This summary provides an overview of the Division of Energy Resources' ("the Division") fourth annual legislative report on the status of ratepayer-funded energy efficiency activities in the Commonwealth, and the extent to which the statewide energy efficiency goals are being met.

Highlights

- ❖ *Energy efficiency programs improved reliability and lowered wholesale electricity prices through demand reduction by almost \$8.5 million in 2001.*
- ❖ *Participants saved over \$28 million on their 2001 electric bills. These bill savings are projected to grow to approximately \$332 million over the lifespan of the installed measures.*
- ❖ *Participating customers and ratepayers invested \$183 million in 2001 to achieve the savings.*
- ❖ *Energy efficiency investments created an estimated 1,841 new jobs, contributing \$129 million to the gross state product in 2001. An additional 290 jobs will result from bill savings over the lifetime of these investments.*
- ❖ *Energy efficiency programs improve air quality in Massachusetts and the New England region.*

Massachusetts Energy Efficiency Programs Win Top Honors Nationally

Northeast Energy Efficiency Partnerships
Sponsored by NSTAR, MECO,
WMECO, Unitil & CLC
(4 Awards)



Massachusetts Electric/National Grid
(4 Awards)



Western Massachusetts Electric/Northeast Utilities
(2 Awards)



Massachusetts energy efficiency administrators received 10 exemplary awards out of 31 given nationally by the American Council for an Energy Efficient Economy (see page 8 for details).

The overall goal of Massachusetts energy efficiency programs is to strengthen the economy and protect the environment by increasing the efficiency of energy use. Listed below are the specific objectives of these programs.

Energy Efficiency Operational Objectives:

- (1) Reduce the use of electricity cost-effectively (as directed by the Department of Telecommunications and Energy).
- (2) Ensure that energy efficiency funds are allocated to low-income customers consistent with the requirements of the Act, and allocated equitably to other customer classes.

Energy Efficiency Programmatic Objectives:

- (3) Reduce customer energy costs by balancing short-run and long-run savings from energy efficiency programs.
- (4) Support the development of competitive markets for energy efficiency products and services.

The following report chronicles the fourth year of the energy efficiency programs designed to meet these objectives.

2001 Participants Saved Over \$28 Million On Their Electric Bills

Program participants saved over \$28 million on their 2001 electricity bills, an increase of \$9 million from the previous year. This total is significantly higher than in prior years due to the increase in default and standard offer prices during 2001. Energy efficiency activities become even more important during times of high electricity and fuel prices. Assuming that the energy efficiency equipment installed in 2001 remains in place for its full lifetime (an average of almost 15 years), total savings are projected to grow to approximately \$332 million. Collectively, participants saved an average of 5 percent on their 2001 electricity bills. Table 1 shows average bill impacts by customer type.

Table 1: 2001 Average Bill Impacts from Energy Savings

Customer Class	Total Annual Bill Reductions for Participants	Avg. Annual Bill Savings per Participant
Low-Income	\$1,010,178	\$39
Residential	\$8,187,869	\$37
Small C&I	\$2,535,195	\$774
Medium C&I	\$3,158,496	\$1,854
Large C&I	\$13,875,175	\$16,737
Total/Average	\$28,766,914	\$114

Program participation levels in 2001 varied greatly among the different customer sectors (see Table 2). Low-income customer participation rates were 5 percent, based on an eligibility threshold of 200 percent of the Federal Poverty Level. Comparatively, residential participation levels were more than twice that of low-income customers, at 13 percent of total eligible households. Large C&I customers continue to have a high participation rate, reflecting the fact that large electricity users reap the greatest savings (as a percent of their total operating costs) by improving the efficiency of their facilities, and often participate in programs more than once a year. Small C&I customers, and to a lesser extent Medium C&I customers, have the lowest participation rates despite potential bill savings and efforts to target these customers. These lower rates can be explained by barriers these customers face to investing in energy efficiency, including a lack of energy management resources.

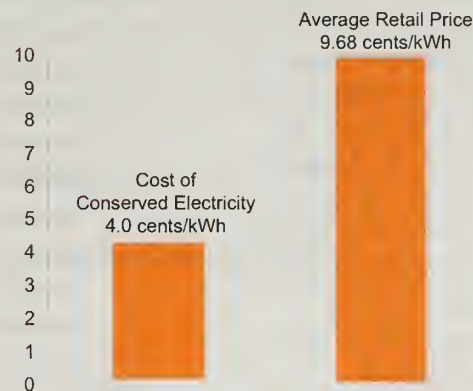
Table 2: 2001 Energy Efficiency Program Participation

Customer Sector	# of Participants	% Served
Low-Income	27,114	5
Residential	219,769	13
Small C&I	3,275	1
Medium C&I	1,704	4
Large C&I	829	15
Total/Average	252,691	10

The Cost To Conserve Electricity Is Nearly 59 Percent Less Than The Cost To Buy It

A total of \$183 million was invested in energy efficiency program activities in 2001 (comprised of \$135 million collected from ratepayers and \$48 million contributed by participants). An estimated 4,571 million kilowatt-hours will be saved over the lifetime of the investments. On average, this represents a cost of conserved energy of 4.0 cents/kWh for program participants – nearly 59 percent less than the projected average retail electricity price of 9.68 cents/kWh (in 2001 dollars) over the same period. Figure 1 illustrates this comparison.

Figure 1: Cost of Conserved Electricity vs. Average Retail Price



Energy Efficiency Investments Creating Jobs in the Commonwealth

Energy efficiency activities promote the expansion of Massachusetts energy efficiency industries and other industries in the state. For example, the Division's economic model estimates that 2001 ratepayer-funded investments in energy efficiency will create 1,841 new jobs in Massachusetts, contributing \$129 million to the gross state product. In addition, \$66 million in disposable income will be gained from these jobs, most of which will be realized in the short-term. These jobs are concentrated in the services, retail trade and manufacturing sectors.

Energy efficiency activities also have longer-term impacts through bill savings to both residential customers and businesses. For example, residential customers can spend their savings on other consumption goods. Businesses become more competitive and can re-invest the savings. These economic impacts through bill savings last over the lifetime of the energy efficiency measures. In addition, the Division estimates that the lifetime bill savings generated 290 permanent jobs. As a result, DOER estimates increases to gross state product and disposable income of \$25 million and \$18 million, respectively, over the 15-year lifetime of the measures.

The Competitive Market for Energy Efficiency Services Contracts

One indication of whether the competitive market for energy efficiency services has developed in Massachusetts is to observe the extent to which competitive retail suppliers provide customers with products and services. As was the case in 2000, the Division continues to observe a lack of energy efficiency services offered by competitive retail suppliers due to limited activity in the retail electricity market in general.

However, another measure of competition in the energy efficiency market is the extent to which ratepayer-funded program services (e.g., program implementation) are competitively procured. The Act requires that competitive procurement processes be used to the greatest extent practicable when delivering programs to Massachusetts customers. These procurement processes benefit customers by providing lower, competitively set program costs, as well as by introducing innovative elements to program designs and/or implementation. In 2001, 83 percent (or \$111.8 million) of total energy efficiency expenditures was competitively procured outside of the administering distribution company. This level of competitive procurements was higher than levels in prior years.

NSTAR Electric Low-Income Multi-Family Program

Buttonwood Acres, New Bedford

NSTAR Electric served 132 units at Buttonwood Acres through its Low Income Multi-Family Program. The project consisted of refrigerator replacements and lighting retrofit for high-use fixtures throughout the housing development.

Total Project Cost: \$55,886

Total Incentives: \$55,886

Participant Cost: \$0

Estimated Annual Bill Savings: 68,317 kWh or \$7,514

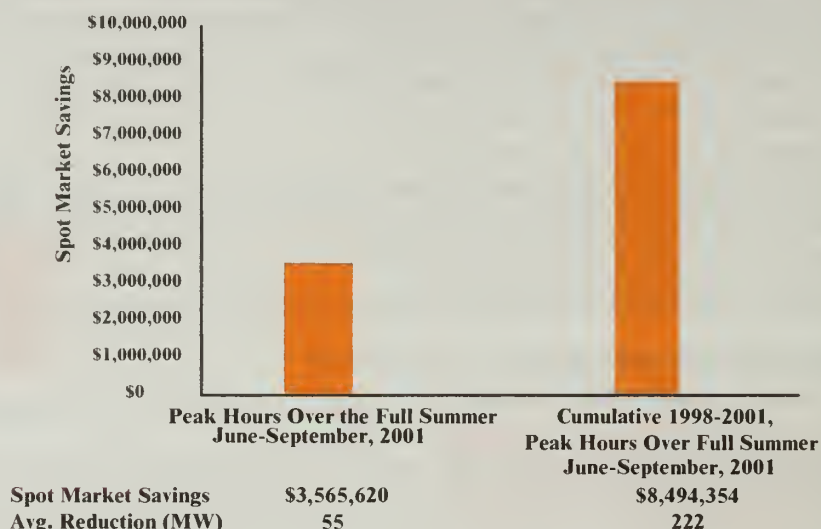
Estimated Lifetime Bill Savings: 915,937 kWh or \$100,733

Energy Efficiency Investments Improve Reliability and Lower Wholesale Electricity Prices

Load reductions help reduce wholesale energy prices especially during those 10 to 100 hottest hours a year when demand is straining generation capacity to the limit. By reducing demand during peak usage periods, energy efficiency programs contribute to system reliability in terms of supply adequacy within a particular area or region and can enhance reliability of local transmission and distribution networks. This is especially important in Massachusetts where there is constrained transmission into areas in metropolitan Boston and the Cape and Islands. By reducing load and demand on the power distribution network, energy

efficiency programs decrease the costly likelihood of system failures. The programs also help avoid higher wholesale energy clearing prices. The Division estimates, for example, that about \$3.6 million in additional costs were avoided over the peak summer months (June to September) of 2001. Further, when considering the cumulative demand reduction impact in 2001 from energy efficiency measures installed over the period 1998 through 2001, the Division estimates total savings of \$8.5 million (see Figure 2).

Figure 2: Potential Impact of Demand Reductions on the Energy Spot Market



Energy Efficiency Programs Improve Air Quality in Massachusetts and the New England Region

In year 2001, ratepayer-funded energy efficiency activities reduced the amount of air polluting emissions released by electricity generating units by reducing electricity demand. While it is difficult to attribute energy efficiency-derived emissions reductions to any specific Massachusetts generating facility, overall emissions by the regional power system were reduced. The annual emission reductions for the three most critical pollutants – nitrogen oxides (NO_x), sulfur oxides (SO₂), and carbon dioxide (CO₂) – were 791 tons, 1,581 tons, and 280,100 tons, respectively (see Figure 3). The NO_x emission reductions are roughly equivalent to the annual emissions of 59,799 passenger cars. The SO₂ emission reductions are equivalent to avoiding the burning of 112,567 tons of bituminous coal, the primary type of coal burned for electricity generation. The 280,100 tons of reduced CO₂ emissions are equivalent to the annual emissions of 56,822 cars and light vehicles. The Division further estimates that over the lifetime of energy efficiency measures installed in 2001, emission reductions for these pollutants will be 7,190 tons, 10,029 tons, and 2,231,400 tons, respectively. Thus, the air quality benefits from 2001 energy efficiency activities will continue over the long-term.

Figure 3: Energy Efficiency Programs Reduce Annual Emissions



Summary of Energy Efficiency Funds Collected and Expended

A total of \$122.1 million was collected from ratepayers during 2001 to support energy efficiency activities. This represents an average of about 2.4 percent of customers' average annual electricity charges. In addition, \$25.9 million of unspent funds in 2000 were carried forward to 2001 program budgets, providing a total of \$148.0 million in Total Available Funds for 2001. Total expenditures for the year were \$135.1 million, leaving a year-end fund balance of \$13.0 million.

Funds Equitably Allocated Across Customer Sectors

The Act directs the Division to ensure that ratepayer funding for energy efficiency is equitably allocated among customer sectors. The Act also directs that low-income program funding levels be at least 20 percent of the amount expended for residential programs, and no less than \$0.00025 per kWh (based upon total kWh sold to all customers). In its analysis, the Division used 200 percent of the Federal Poverty Level as its standard for participation eligibility for the low-income sector.

Available funds in year 2001 for the low-income, residential, and C&I sectors were 8 percent, 34 percent, and 58 percent, respectively, while funds expended were 9 percent, 33 percent, and 58 percent respectively. Comparing Available Funds to Expended Funds, shows that program expenditures were, for the most part, equitably allocated (see Figure 4).

Figure 4: 2001 Available vs. Expended Funds



Note: "Available Funds" refers to 2001 collections from customer sectors and carry over funds from 2000. "Expended Funds" refers to 2001 expenditures plus year-end balances.

Program Activities Balance Short and Long-Term Savings

Ratepayer-funded energy efficiency programs served two fundamental purposes in 2001: they provided immediate savings for participating customers, while also laying the foundation for long-term savings for all customers by transforming energy efficiency markets.

Of the \$135.1 million spent on energy efficiency activities in year 2001, the greatest portion (\$82.4 million) was invested in Retrofit programs. These programs encourage the replacement of outdated and inefficient electrical and/or mechanical equipment, such as lighting, heating and cooling systems, motors, energy management systems, and process redesign/improvements. Financial rebates are used to persuade customers to upgrade to higher efficiency equipment.

Fitchburg Gas & Electric/Unitil Commercial & Industrial Comprehensive Energy Program

Dennison Manufacturing Company, Fitchburg

As part of the company's Comprehensive Efficiency Program handling the installation of energy efficient process chilling equipment, Unitil provided \$85,000 in rebates toward an energy efficient 250 ton chiller and 2 closed circuit coolers. The new equipment replaced aging process cooling equipment that was inefficient and required high maintenance. The new closed circuit cooling towers allowed Dennison to use condenser water in their process, thus eliminating existing die heaters that re-heated previous chilled water.

Total Project Cost: \$333,280

Total Incentives: \$85,000

Participant Cost: \$248,280

Estimated Annual Bill Savings: \$100,000 or 1,000,838 kWh

Estimated Lifetime Bill Savings: \$13,818,104

The second largest portion of funding (\$33.1 million) was spent on Lost Opportunity/New Construction programs. These programs focus on encouraging investment in higher energy efficiency at the time of a naturally-occurring market event, such as construction of a new home or building, major expansion, renovation or remodeling, or replacement of failed equipment. These programs not only provide immediate and long-term savings to participants through rebates, but also target key market players (e.g., architects, designers, and builders) in order to change standard building practice and to upgrade building codes and standards, benefiting all customers over the long-term.

Over 10 percent of expenditures (\$14.8 million) was spent on Regional Market Transformation programs. These programs are typically implemented on a joint basis by distribution company administrators in Massachusetts, coordinated by the Northeast Energy Efficiency Partnership. While these programs provide some immediate savings to participating customers, more importantly, they aim to change the production, purchasing, design, and stocking practices of manufacturers, builders, engineers, architects, and retailers over the long-term. By changing the market practices of these participants to promote purchases of higher energy-efficiency and product services, these programs improve long-term efficiency on a much larger scale than programs that focus on changing the behavior of end-use customers.

The remainder of year 2001 expenditures (\$4.8 million) went largely to educational programs for residential customers with a minor portion to miscellaneous products and services across all sectors.

Program Cost-effectiveness Improved in 2001

According to the methodology for determining program cost-effectiveness [as approved by the Department of Telecommunications and Energy ("the Department")], 2001 ratepayer-funded programs were cost-effective with an overall benefit-cost ratio of over 2 to 1. This ratio measures the value of energy efficiency program savings compared to the associated program costs from a total resource perspective. Specifically, benefits are the value of wholesale electricity, and distribution and transmission costs *avoided* by distribution companies, as well as other resource and non-resource benefits due to program savings over the lifetime of year 2001 installations. Costs are those expended on program activities in year 2001, including participant costs.

Program cost-effectiveness is measured according to guidelines of the Department. Beginning in 2000, the Department allowed a more comprehensive counting of benefits and costs, pursuant to its 98-100 Order. These additional benefits include increased worker productivity and property improvement for homeowners and businesses due to the installation of higher efficiency equipment. Energy efficiency investments also save distribution companies money by reducing such costs as bad debt expenditures and other costs that would be passed on to all customers. Further, customers accrue other resource savings such as reduced natural gas and water bills. For example, an energy efficient clothes washer will not only reduce electricity costs to wash the clothes, but will also reduce water use and if applicable, the gas used to heat the water.

Cape Light Compact Small Commercial & Industrial Program

Cape Cod & Islands Council, Inc., Yarmouth Port
Cape Light Compact and the Rotary Club combined to finance the replacement of inefficient lighting fixtures with newer energy-efficient models in the Council Service Center and at the Boy Scouts' Camp Greenough.
Total Project Cost: \$7,434.50
Total Incentives: \$5,947.60
Rotary Club Donation: \$1,486.90
Estimated Annual Bill Savings: 10,275 kWh or \$1,150
Estimated Lifetime Bill Savings: 112,820 kWh or \$12,622

NSTAR Residential High Use Program

Michael Plone, Framingham
Mr. Michael Plone participated in NSTAR Electric's Residential High Use Program. The energy efficiency measures installed at his home included energy-efficient compact fluorescent bulbs, air sealing, attic insulation and replacement of the existing inefficient refrigerator with a new ENERGY STAR model. In addition to the installation of these measures, the program included diagnostic measurements for air leaks, heat pump efficiency, customer education, and a comprehensive health/safety test.
Total Project Cost: \$3,706.78
Total Incentives: \$2826.58
Participant Cost: \$880.20
Estimated Annual Bill Savings: 7,438 kWh or \$966
Estimated Lifetime Bill Savings: 114,369 kWh or \$14,967

The Department's 98-100 Order directed that, beginning in year 2000, the value of "post program effects/savings" be considered in cost-effectiveness analyses for market transformation programs (see "Program Activities Balance Short and Long-term Savings"). These savings are expected to accrue to customers over the long-term after these programs end (i.e., due to the programs transforming the market for particular technologies). Initial estimates of post program savings show substantial increases in program cost-effectiveness, resulting in an overall cost-benefit ratio of 1 to 2.5. The accuracy of these estimates is subject to further review by the Department.

**Massachusetts Electric/National Grid
Small Commercial & Industrial Retrofit**

Mor-wire & Cable, Lowell

In 2001, Mor-wire & Cable participated in Massachusetts Electric's Small Business Program. The company received incentives to install energy-efficient T-8 lighting fixtures.

Total Project Cost: \$8,865

Total Incentives: \$7,940

Participant Cost: \$925

Estimated Annual Bill Savings: 24,494 kWh or \$2,143

Estimated Lifetime Bill Savings: 168 MWh or \$14,698

Conclusion

The Division concludes that 2001 energy efficiency program activities continued to effectively address the statewide energy efficiency goals. They provided substantial net economic benefit in terms of bill savings to participating customers, and system savings for all customers in the form of generation, transmission and distribution cost savings over the long-term. They also helped to reduce wholesale energy prices in the short-term, costs that would ultimately be paid for by customers. Moreover, they helped to create new jobs in the state both in the short term due to investments in energy efficiency industries, and in the long term through continued bill savings over the lifetime of these investments. Finally, they reduced harmful emissions from fossil-fueled power plants, thus helping to improve air quality. These direct and indirect impacts of the energy efficiency programs continue to benefit the Commonwealth's economy and its citizens. Currently, the energy efficiency programs are scheduled to continue through 2007.

For further information on 2001 energy efficiency activities, please refer to the full report that can be found at the Division's web site: <http://www.mass.gov/doer>.

**Western Massachusetts Electric Company
Comprehensive New Construction Program
Medium/Large Commercial & Industrial New Construction**

The Naismith Basketball Hall of Fame, Springfield

The new Hall of Fame Building is an interactive museum with adjoining retail and conference areas. Two premium efficiency centrifugal chillers of 350 tons were installed. Each was equipped with a variable frequency drive which reduces their Integrated Part Load Value (IPLV) to an incredibly low 0.361 kW/ton cooling. Variable frequency drives on air handler fans were also installed, in addition to variable frequency drives on the chilled water and hot water pumps that precisely match energy use to changes in load conditions. Also, a Static Pressure Reset on variable air volume fans that automatically adjusts the static pressure set point based on the minimum system air volume required was installed.

Total Cost of Project: \$800,000 est.

Total Incentives: \$164,000

Estimated Annual Bill Savings: 715,000 kWh or \$64,350

Estimated Lifetime Bill Savings: 12,074,000 kWh or \$1,086,660

Massachusetts Energy Efficiency Programs Win Top Honors Nationally

Electric utilities operating energy efficiency programs in Massachusetts were recently recognized for having 10 of the top 31 exemplary energy efficiency programs in the country. The American Council for an Energy Efficient Economy recognized Massachusetts Electric/National Grid with four exemplary program awards, and Western Massachusetts Electric/Northeast Utilities with two awards. In addition, sponsors of the Northeast Energy Efficiency Partnership, consisting of NSTAR, Massachusetts Electric/National Grid, Western Massachusetts Electric/Northeast Utilities, Fitchburg Gas & Electric/Unitil, Cape Light Compact and other regional utilities, were recognized with four exemplary program awards. The number of exemplary awards to companies operating energy efficiency programs in Massachusetts led the nation. California, with an energy efficiency budget several times greater than Massachusetts, was the next highest state with eight awards. Summaries of the recognized programs and a full description of the selection process can be found at: www.aceee.org

ACEEE Award Winning Massachusetts Programs**Massachusetts Electric/National Grid**

Small Commercial Programs-Small Business Service Program
Commercial & Industrial New Construction Programs-Design 2000 Plus
Commercial & Industrial Custom and Comprehensive Programs-Energy Initiatives Custom Measures
School and Municipal Government Programs-Schools Initiative

Sponsors of the Northeast Energy-Efficiency Partnerships, Inc.

Home Energy Appliances Program-ENERGY STAR Appliances
Residential Lighting Program-ENERGY STAR Lighting
Commercial & Industrial HVAC-Cool Choice
Professional Education-Building Operator Certification & Flexible Technical Assistance

Western Massachusetts Electric Company/Northeast Utilities

Commercial & Industrial New Construction Programs-Energy Conscious Construction
Commercial & Industrial Custom and Comprehensive Programs-Customs Services

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